2.4 General Views

In addition to the comments raised in the previous para., in order to achieve and accomplish more effective productivity in its organizational performance of the BMA and to upgrade the capability and competence of the staffs, it might be advisable to observe the general views as stated below.

It is suggested for DPW of the BMA which is responsible for development, improvement, rehabilitation and maintenance of all the roads in the huge Metropolis which require tremendous amount of workloads with a very limited expenditure budget, to execute and administer such works very efficiently with very proper allocation of the budget to each programme and project.

For this purpose, it is recommended to establish quite a comprehensive methodology and measure in its execution so that the decision makings at policy, planning, implementation and evaluation levels can be attained in accordance with the very accurate identification of the existing situation and problem area based on the objective and rational data and information.

The general view covers two aspects, one on suggestion and recommendation for the functional improvement, and the other on the new idea for the structural reorganization of road administration of the BMA.

(1) Functional Improvement

1) Strengthening planning capability

The fundamental of the effective administration lies in the basic management principle of "plan, do and check" which shall be adhered in every function of the BMA. It is to be further pointed out that effective and practical plan on road and road transport can only be worked out by the well-prepared and rational data and information such as road inventory, traffic volume, traffic origin and destination, turning movement, pavement condition, traffic accident, etc.

In this respect, it is observed that importance of necessary and required information, its continuous periodic collection, updating and analysis of such information and data have yet to be encouraged at every level and function of the organization. For practical realization of this MIS, whether application of computer or not, it is advisable for the top ranking officials to review and reorganize the management information system. At the same time, the sub-system on information flow shall be well understood by all the staff members of the organization for optimum utilization of

such information for their daily works.

As for the management information system for the roads in the BMA, in addition to the necessary information for planning purpose, it shall be adopted for designs, land acquisition, right of way, and then, to the actual construction, improvement and rehabilitation with proper control and supervision. This system shall be also applied to the monitoring and revelation of the project being implemented which shall be recycled for use in planning purpose.

2) Functional improvement

It is observed that more integrated planning and implementation of urban infrastructural development and improvement shall be needed by closer and harmonious cooperation and coordination among those departments and divisions within the BMA organization concerned with roads, not only by means of periodic discussions at various committees among the committee members, but, also by more frequent and timely ad-hoc discussions between the officials directly concerned with the matters which need consensus and immediate action.

Also, it is suggested that for a certain development or improvement program, it might be necessary to set up a permanent task force or project team consisting of the representatives of the concerned departments and divisions to work in the same office from planning stage to the completion of such program.

3) Encouragement of effective training

For the purpose of upgrading and expansion of the capacity and capability of the DPW staffs and for the effective motivation to the responsibility assumed in their present and future works, it is the vital importance to plan and execute various technical and managerial training programs to be organized by Public Works Planning Sub-Division of the DPW.

The training may be classified into two types, the one for the in-house training mainly aimed at dissemination of the new method or procedure to be introduced in the department, either in technical or managerial aspect, and the other for utilization or participation to the outside seminar or training course.

It is also advisable to set up a certain criteria for selection of the staffs to participate, for appraisal of the training after attendance, and

possibly for promotional opportunity for those attended and marked a good score.

4) Active introduction of computer

It is most essential, especially for the works of the DPW to fully utilize the advantage and efficiency of computer, either for the data processing, summation or analysis as proposed for Road Inventory in this study. Similar type of introduction of computer can be found at various fields of functions, such as building control, mapping for the land acquisition and right of way, etc., in addition to those areas for processing of traffic data.

However, it is advisable at time of introduction to hire a suitable consultant for system analysis, design and programming and for training of the personnel who will assume responsibility of operation and maintenance of the software and hardware.

The proper use of computer will consequently improve the productively of the department.

(2) New Ideas for Structural Reorganization of Road Management

The study on the review of road organization of the BMA has been and their comments and recommendation have been based on the existing organizational structures and related functions. Here, a new idea is proposed for restructuring of road organization of the BMA, which needs further extensive and intensive studies before any actual steps are taken.

1) Reorganization by Type of Facility

Existing organizational structure of DPW is based on the functional classification such as design, construction and maintenance, right of way and land acquisition, etc., which is in a way effective for confined work in its category. However, there seems so much disruption and delay in the continuous flow of works for various types of public works such as road, building, drainage, etc.

Therefore, an organizational structure of DPW based on the classification by type of facility, such as road, building and etc. will improve efficiency of administration and management of not only the road but also other facilities which the BMA is responsible. By this organization, an integrated series of work flow from research, planning, design, implementation and monitoring of road and other public work facilities can be improved in its administration and management of the BMA.

OTHER STUDIES

3. OTHER STUDIES

3.1 Flood Prevention Measures for the Roads

3.1.1 General Strategy of Flood Prevention Measures for the Roads

In general strategy of flood prevention measure for the road, it is economically not feasible to protect all the roads equally. And it is natural to secure a number of selected trunk roads protected from flood due to importance of maintaining the major road traffics for passenger and cargo needed for continuous social and economic activities of the country.

It is necessary to raise the design height of these selected trunk roads located in the areas where road inundation from flood is expected. However, as to the roads in the urbanized areas, it might not be possible to raise the road height for flood protection, due to various land uses committed to commercial, residential and public purposes or to the engineering factors in access road connection. In such case the flood protection measure shall be executed by means of well-equipped drainage facilities. Especially, the interchanges and intersections of such urban roads should be safer against water than the roadway. It is also very important not only for the inhabitants but also for the road itself to design not to decrease the existing natural and artificial drainage capacity in the urbanized area in its new construction or improvement.

3.1.2 Flood Prevention Measures for the Road in Bangkok

The drainage capacity in the City Core District and the Eastern Suburb District has been much improved by the Drainage and Sewerage Dept. (DDS) of the BMA and Royal Irrigation Dept. (RID) since 1983, and at present a lot of drainage works are going on for further improvement. The flood risk in Bangkok has been changed from the long-period and large-area type to the short-period and small-scale type. It can be said that if the pumps and the gates had been operated more efficiently in May, 1986, the flood could have been much shallower and drained out much earlier.

However, road improvement for drainage purpose shall be executed according to the priority of the road determined by the urban road classification criteria for such a short-period and small-scale flood.

As to a criteria to select the main roads, Class I and Class II may fall in the category. Appendix 3.1.1 shows the road inundation condition on the

11th May, 1986, and according to this figure, the road inundated in Class I is only Vibhavadi Rangsit Road. As to the roads or road sections inundated in Class II, north-eastern part of the Middle Ring Road is affected. At present there is a plan at the DDS to drain the water on Dindaeng-Inthamara section on Vibhavadi Rangsit Road to Khlong Sam Sen and Khlong Bang Sue. Also, a drainage plan is going on for the north parts of Vibhavadi Rangsit Road and Middle Ring Road to drain the water to Khlong Prem Prachakon in close coordination with the plan to newly construct the missing part of the Middle Ring Road. It is anticipated that upon completion of this plan implementation there will be no inundation on the roads in Class I and II. It is advised to plan and implement certain proper measures for flood protection to the roads in Class III also. Especially at those sections of New Petburi, Sukhumvit and Rama IV roads where a partial inundation can been seen, flood protection measures shall be reviewed to include the partial raising of the pavement, in coordination with the local drainage plans in those areas.

The short-period and small-scale areal flood measure is to discharge rainfall on the roads into the Khlongs more quickly by improving the capacity of drain pipes and street inlets, especially at intersections.

3.1.3 Combined Structure with the Road and the Polder Dyke

The land subsidence in Bangkok results mainly from a large amount of groundwater pumped up at an average of 1.0 - 0.8 million m^3/day which corresponds to about 40 percent of the total consumption of the municipal water. As the amount of groundwater consumption is supposed to be constant from now on, the subsidence will go on, too.

According to the flood mitigation studies by the DDS, the raising of the existing roads along the Chao Phraya River is planned as the most economical measure in terms of public cost. The road to be lifted along the river stretches 20 km long, 11.7 km on the City Core side and 8.3 km on Thonburi side. Also as the boundary polder, 8.4 km of the roads in Thonburi side, and 0.9 km of the Expressway between the City Core and the eastern suburb are planned. However, these plans to raise the road height shall be carefully reviewed taking full consideration of the land uses along these roads.

The plan to raise the existing road not only for the flood barrier, but also for the protection of road itself against water seems adequate from the view point of flood protection. However, since the main function of

the road is to facilitate the public transport, such plan shall be reviewed again very comprehensively as soon as possible taking into account the impact and effect of total economics to the public and private sectors, with proper cooperation and coordination of the PWD and DDS of the BMA.

More detailed discussion is presented in Appendix 3.1.1.

3.2 Common Duct

3.2.1 Introduction

The role of road is not only for traffic, but also for various other functions.

One of them is to provide space for public utilities such as electric cables, telephone cables, water pipes, gas pipes, sewerages and so on. If their installation works are done arbitrarily, roads will be always dug up, traffic flows will be hampered, traffic safety will not be ensured, and people along the road will be awfully troubled.

Now, construction of common ducts intends to cope with this problem by accommodating those public utilities in one duct for joint use. Once a common duct system has been developed, digging up of roads is no longer necessary and it brings a great deal of advantages to road maintenance and administration in planning, work load, cost, etc.

3.2.2 Necessity of Common Duct

The traffic congestion in Bangkok is so serious that most of the major roads in the city are often paralyzed completely because of substantial shortage of the road density. Under this circumstance, even a partial road block by a road excavation work directly tends to cause traffic paralysis over a large area.

In Bangkok, the public utility enterprises of telephone, electricity, water works are repeating excavations of the roads by their own schedules. This practice has been blamed by citizens.

To improve this situation, firstly, it is necessary for public enterprises and road administrator to fully coordinate to plan and execute the road excavations for simultaneous installation of underground public facilities such as telephone, electricity and water sewerage.

Secondary, it is necessary to designate and construct common duct-provided-roads under adequate rules for allocating the construction and management costs, based on each individual advantage given by a common duct.

3.2.3 Outline of Common Duct

Brief explanation of common duct is described below, which is common practice in Japan.

(1) Definition of common duct

A common duct is defined as a facility laid underneath a road by the road administrator to accommodate more than two kinds of public utilities.

In other words, a common duct is an accessory to a road, and accommodate public utilities such as,

1) Telephone cable
2) Electric power cable
3) Gas pipe
4) Water pipe
5) Industrial water pipe
6) Sewerage pipe

(2) Kinds of common ducts

1) Trunk line common duct

A trunk line common duct, laying underneath the carriageway, has the purpose to accommodate only the main cables and the main pipes, but not the branch lines.

Those main cables are for connecting two electric sub-stations or two telephone relay stations, and the main pipes are for connecting main gas station to sub gas stations. Almost all of common ducts already completed in Japan are this kind of trunk line common ducts.

2) Supply (branch) line common duct

A supply line common duct, laying underneath the both sidewalks of a road, is to contain branch line cables and pipes which are serving directly to the neighboring users of the road.

A supply common duct is used not only for preventing sidewalks from frequent excavations, but also for facilitating fire-fighting works and improving the scenic beauty of the street by transferring various overhead wires to underneath the sidewalks.

3) CAB (Cable Box)

CAB is the most simple common duct laying underneath the both sidewalks for containing only telephone and electric branch lines which are also transferred from overhead.

CAB will play an important role in the highly developed information society in the near future by containing various information lines.

A typical scheme of the kinds of common duct and the cross section of its typical trunk line are shown in Figures 3.2.1 and 3.2.2, respectively.

(3) Master plan for common ducts

The master plan for common ducts will show the goal at the time of ten to twenty years to come.

Planning Committee for Common Duct (called the Committee hereafter) consisting of the officials in charge of the roads, city planning and public corporations shall be established.

The Committee shall determine the basic program of the investigation necessary to decide the basic plan for common duct and shall issue the instructions required.

The flow chart of investigation for common duct network is shown in Figure 3.2.3.

(4) Allocation of construction cost by public enterprises

Because a common duct is an accessory to a road, the road administrator ought to construct it at his own expenses, in a sense.

On the other hand, considering advantage given to both the road administrator and the public enterprises, the common duct law prescribes the allocation of construction cost among them.

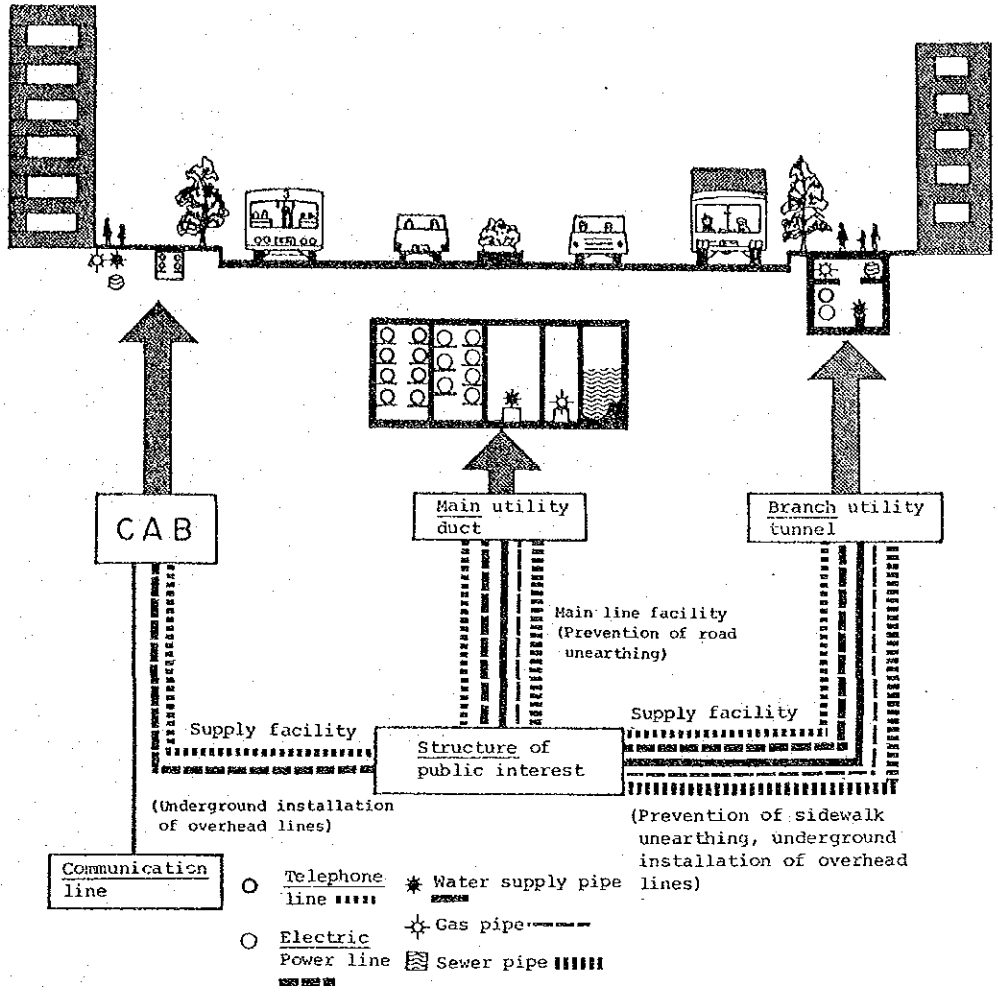


Figure 3.2.1 Basic Concept of Common Duct

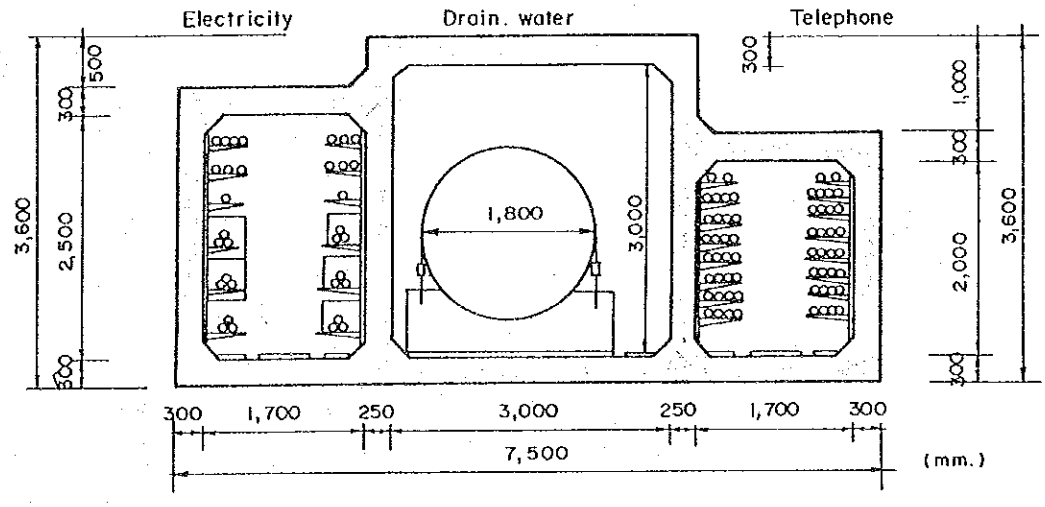


Figure 3.2.2 Typical Cross section of Trunk Line Common Duct

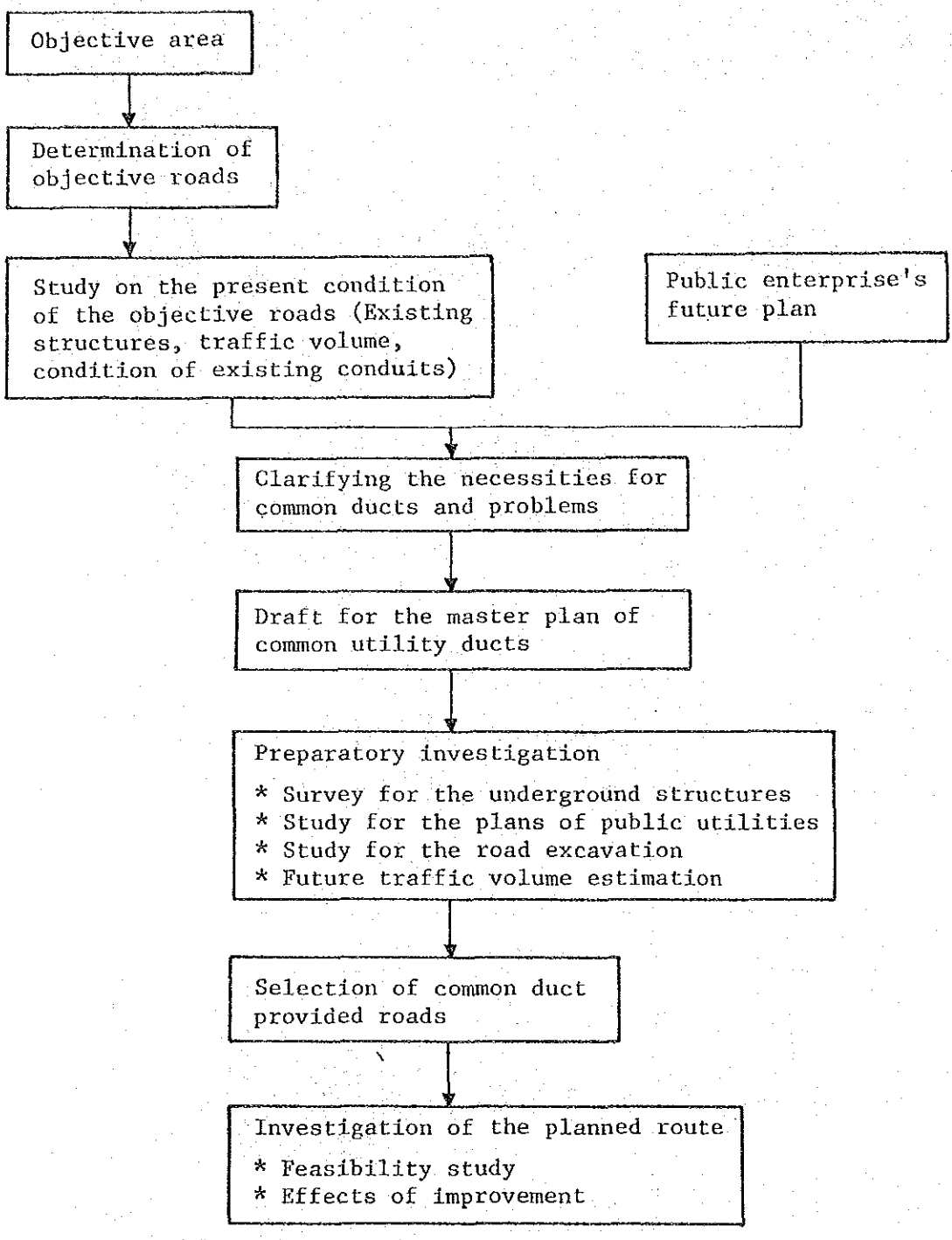


Figure 3.2.3 Flow Chart of Investigation for Common Duct Network

APPENDICES

City Planning Division

No.	Name	From	To	Type of pavement	Pavement width (m)	Length (m)	Type and width (m) of sidewalk pavement			Right of way (m)	Drainage facilities			Pavement area (m^2)	Area of pavement and sidewalk (m^2)	Remarks
							Left		Right		Left		Right			
18	Soi Wat Kai Tea	Chaiya Rreck St.	Wat Kai Tea	Asphalt	3.00	260	Asphalt 0.5		0.5					780	1,040	
19																
20																

Right of Way and Land Acquisition Division (1)

No.	Name of Street	From	To	Right of Way Width (m)	Length (m)	Type of Pavement	Sidewalk Width				Remarks
							North	South	East	West	
1											
2											

Right of Way and Land Acquisition Division (2)

Type of pavement	Condition of use	Length (m)	Pavement width (m)	Radius of horizontal curvature (m)	Allowable vehicle load (ton)	Width of sidewalk and shoulder (m)	Right of Way width on both sides (m)	Drainage facility	Parking (buses)	Roadside trees		Light pole				Date of record	Signature	Remarks
										Kerb width (m)	Space for trees (m)	Kerb width (m)	Distance to road edge (m)	Height from pavement surface (m)	Height from the surface of pedestrian crossing (m)			
Asphalt	All-weather	1,463	26.00 (including median strip)	-	-	Right 4.00m Left 3.50m	Right 17.00m Left 16.50m	Pipe culvert provided along the road	No. of bus stops on right side = 4 No. of bus stops on left side = 5	Right 1.00 Left 0.80	Right 5.0~8.4 Left 13.3~26.0	Right 0.6 Left 0.5	Right 3.4 Left 3.0	5.0	7.0	November 16, 1983		

Existing Road Inventory Form

Contents of Control Link File (A)

No	Item	Field Name	Data	Unit	Code Index	Checking	Remarks
	(Identifier)						
1	Start Node	STARTNO	9(7)				
2	End Node	ENDNO	9(7)				
	(Place)						
3	District	DISTRICT	9(2)		1	CMC	
4	Street	STREET	9(6)		2	CMC	
5	Road Class	CLASS	9(2)		3	CMC	
6	Road Administrator	ADMINIST	9(1)		4	CMC	
7	Type of Cross Section	CROSTYPE	9(2)		5	CMC	
8	Land Use, Exis. (L1)	LNDUSEL1	9(2)		6	CMC	
9	(L2)	LNDUSEL2	9(2)		6	CMC	
10	(R1)	LNDUSER1	9(2)		6	CMC	
11	(R2)	LNDUSER2	9(2)		6	CMC	
12	Future (L1)	LNDUSFL1	9(2)		6	CMC	
13	(L2)	LNDUSFL2	9(2)		6	CMC	
14	(R1)	LNDUSFR1	9(2)		6	CMC	
15	(R2)	LNDUSFR2	9(2)		6	CMC	
16	No. of Crossing Roads (L)	CROSSRDL	9(2)				
17	(R)	CROSSRDR	9(2)				
18	Existence of Railway crossing	CROSSRAIL	X(4)	M			Distance from start node
19	Existence of Bus Route	BUSROUTE	9(2)		7	CMC	
20	No. of Bus Stops	BUSSTOP	9(2)				Count for one side
21	Pedestrian Crossings	PEDCROSS	9(2)				Marking
22	Bridges	BRIDGE	9(2)				
23	Pedestrian Bridges	PEDBRIDGE	9(2)				
24	Pavement type of Carriageway	PAVETYPE	9(1)		8	CMC	Major material
	(Existence of Appurtenances)						
25	Trees	TREE	9(1)		11	CMC	
26	Drain pipe	DRAIN	9(1)		11	CMC	Drainage for road
	(Exis. of Public Utilities)						
27	Electricity Circuit	ELECTRCTY	9(1)		11	CMC	
28	Telephone Circuit	TELEPHONE	9(1)		11	CMC	
29	Water Supply Pipe	WATERSPLY	9(1)		11	CMC	
30	Gas Pipe	GAS	9(1)		11	CMC	
31	Fuel Pipe	FUEL	9(1)		11	CMC	

Contents of Control Link File (B)

No	Item	Field Name	Data	Unit	Code Index	Checking	Remarks
	(Identifier)						
1	Start Node	STARTNO	9(7)				
2	End Node	ENDNO	9(7)				
	(Geometric Data)						
3	Link Length	LENGTH	9(7)	M			
4	Right of Way	WIDROW	9(7.2)	M		≧21	
5	Area of Right of Way	AREAROW	9(7)	M^2		=3X4X0.9<or<3X4X1.1	
6	No. of Lanes for P.T. (L)	LANEPTL	9(2)				Public traffic
7	(R)	LANEPTR	9(2)				
8	(Sub Total)	LANEPTT	9(2)			=6+7	
9	No. of Lanes for Bus (L)	LANEBSL	9(2)				Exclusive lane
10	(R)	LANEBSR	9(2)				
11	(Sub Total)	LANEBST	9(2)			=9+10	
12	No. of Lanes Total	LANETOTAL	9(2)			=8+11	
13	Width Carriageway (L)	WIDCARL	9(6.2)	M			
14	(R)	WIDCARR	9(6.2)	M			
15	(Sub Total)	WIDCART	9(6.2)	M		=13+14	
16	Median (Total)	WIDMED	9(6.2)	M			
17	Foot Path (L)	WIDFPL	9(6.2)	M			
18	(R)	WIDFPR	9(6.2)	M			
19	Shoulder (L)	WIDSLDL	9(6.2)	M			
20	(R)	WIDSLDR	9(6.2)	M			
21	Total	WIDTOTAL	9(6.2)	M		=15+16+17+18+19+20	
	(Appurtenances)						
22	Exis.of Lane Marking	MARKLANE	9(1)		11	CMC	Marking for Lane separation
23	Edge Marking	MARKEDGE	9(1)		11	CMC	
24	Curb Marking (L)	MARKCURBL	9(1)		11	CMC	Marking for prohibition
25	(R)	MARKCURBR	9(1)		11	CMC	
26	Type of Fence (L)	FNCTYPL	9(1)		12	CMC	
27	(R)	FNCTYPR	9(1)		12	CMC	
28	(M)	FNCTYPM	9(1)		12	CMC	
29	Length of Fence (L)	FNCLNGL	9(4)	M		≦3	
30	(R)	FNCLNGR	9(4)	M		≦3	
31	(M)	FNCLNGM	9(4)	M		≦3	

Contents of Control Link File (C)

No	Item	Field Name	Data	Unit	Code Index	Checking	Remarks
	(Identifier)						
1	Start Node	STARTNO	9(7)				
2	End Node	ENDNO	9(7)				
	(Traffic Management)						
3	Regulation of Direction	REGULATION	9(2)		9	CMC	One-way, two-way
4	Parking Prohibition (L)	PRHPARKL	9(1)		10	CMC	
5	(R)	PRHPARKR	9(1)		10	CMC	
6	No. of Regulatory Signs	SIGNREG	9(3)				
7	Warning Signs	SIGNWRN	9(3)				
8	Guide Signs	SIGNGUID	9(3)				Incl. information signs
9	Total Signs	SIGNTOTAL	9(3)			=6+7+8	
10	No. of Signaled Locations	SIGNAL	9(3)				Location where set of traffic signals are installed (except nodes)
	(Traffic Data)						
11	Traffic Volume	VOLCAR	9(5)				12 hours
12	Motorcycle Volume	VOLMC	9(5)				12 hours
13	Peak Traffic Volume	VOLPEAK	9(5)				1 hours, excluding motorcycle
14	Travel Speed	SPEED	9(5)	km/h			Peak
15	Capacity	CAPACITY	9(5)				12 hours
16	Congestion Degree	CONGESTION	9(5.2)				Volume/capacity
17	No. of Accidents	ACCIDENT	9(3)				
18	Fatalities	FATARITY	9(3)				
19	Injuries	INJURY	9(3)				
	(Road Conditions)						Judged results
20	Surface	CNDSURF	9(1)		13	CMC	
21	Marking	CNDMARK	9(1)		13	CMC	
22	Lighting	CNDLIGHT	9(1)		13	CMC	
23	Flood Records	FLOODREC	9(2)	cm			Max water depth in past five years
	(Records)						
24	Free Comments	COMMENT	X(30)				
25	Updated Year	UPDATYEAR	9(4)	BE			
26	Month	UPDATMONTH	9(2)				

Contents of Bridge File

No	Item	Field Name	Data	Unit	Code Index	Checking	Remarks
	(Identifier)						
1	Start Node	STARTNO	9(7)				
2	End Node	ENDNO	9(7)				
3	Sequential No.	SEQNO	9(1)				
	(Place)						
4	District	DISTRICT	9(2)		1	CMC	
5	Street	STREET	9(6)		2	CMC	
	(Bridge Data)						
6	Name or Location	BRNAME	X(20)				
7	Purpose of Crossing	PURPOSE	9(1)		14	CMC	Canal, road, etc
8	Type	TYPE	9(2)		15	CMC	Material and structural type
9	Length	LENGTH	9(6.2)	M			
10	No. of Spans	NOSPAN	9(2)				
11	No. of Lanes	LANE	9(2)				For whole traffic
12	Width of Carriageway	WIDCAR	9(6.2)	M			
13	Foot Path (L)	WIDFPL	9(6.2)	M			
14	(R)	WIDFPR	9(6.2)	M			
15	Clearance Vertical	CLEARV	9(6.2)	M			
16	Horizontal	CLEARH	9(6.2)	M			
17	Existence of Lighting	LIGHT	9(1)		11	CMC	
18	Year Construction Com'd	CONSTYEAR	9(4)	BE			
19	Constructor	CONSTRCTR	X(20)				
20	Construction Costs	CONSTCOST	9(10)	Baht			
21	Repairing, Type of Works	REPWORK	9(1)		16	CMC	
22	Year	REPYEAR	9(4)	BE			
23	Repainting Year	REPNTYEAR	9(4)	BE			
24	Conditions	CONDITION	9(1)		13	CMC	Visual judgment
	(Records)						
25	Free Comments	COMMENT	X(30)				
26	Updated Year	UPDATYEAR	9(4)	BE			
27	Month	UPDATMONTH	9(2)				

Contents of Pedestrian Bridge File

No	Item	Field Name	Data	Unit	Code Index	Checking	Remarks
	(Identifier)						
1	Start Node	STARTNO	9(7)				
2	End Node	ENDNO	9(7)				
3	Sequential No	SEQNO	9(1)				
	(Place)						
4	District	DISTRICT	9(2)		1	CMC	
5	Street	STREET	9(6)		2	CMC	
	(Details)						
6	Name/Location	PDBRNAME	X(20)				
7	Type	TYPE	9(2)		15	CMC	Material and Structural type
8	Length	LENGTH	9(5.2)	M			
9	No. of Spans	NOSPAN	9(1)				
10	Effective Width	WIDEFECT	9(5.2)	M			
11	Clearance Vertical	CLEARV	9(5.2)	M			
12	Horizontal	CLEARH	9(5.2)	M		≤8	
13	Existence of Lighting	LIGHT	9(1)		11	CMC	
14	Year Construction Com'd	CONSTYEAR	9(4)	BE			
15	Constructor	CONSTRCTR	X(20)				
16	Construction Costs	CONSTCOST	9(10)	Baht			
17	Repairing, Type of Works	REPWORK	9(1)		16	CMC	
18	Year	REPYEAR	9(4)	BE			
19	Repainting Year	REPNTYEAR	9(4)	BE			
20	Conditions	CONDITION	9(1)		13	CMC	Visual judgment
	(Records)						
21	Free Comments	COMMENT	X(30)				
22	Updated Year	UPDATYEAR	9(4)	BE			
23	Month	UPDATMONTH	9(2)				

Contents of Pavement File

No	Item	Field Name	Data	Unit	Code Index	Checking	Remarks
	(Identifier)						
1	Start Node	STARTNO	9(7)				
2	End Node	ENDNO	9(7)				
3	Sequential No.	SEQNO	9(1)				
	(Place, etc)						
4	District	DISTRICT	9(2)		1	CMC	
5	Street	STREET	9(6)		2	CMC	
6	Distance from Start Node	DISTANCE	9(4)	M			Starting point
7	Segment Length	SEGLENGTH	9(4)	M			
	(Detail of Pavement)						
8	Type of Carriageway	TYPCAR	9(1)		8	CMC	
9	Foot Path (L)	TYPFPL	9(1)		8	CMC	
10	(R)	TYPFPR	9(1)		8	CMC	
11	Median/Island	TYPMED	9(1)		8	CMC	
12	Shoulder	TYPSLD	9(1)		8	CMC	
13	Area of Carriageway	AREACAR	9(6)	M^2			
14	Foot Path (L)	AREAFPL	9(6)	M^2			
15	(R)	AREAFPR	9(6)	M^2			
16	Total	AREATOTAL	9(6)	M^2		≦13+14+15	
17	Constructed Year	CONSTYEAR	9(4)	BE			
18	Constructor	CONSTRCTR	X(20)				
19	Construction Costs	CONSTCOST	9(10)	Baht			
20	Conditions of Carriageway	CNDCAR	9(1)		13	CMC	Visual judgment
	(Records)						
21	Free Comments	COMMENT	X(30)				
22	Updated Year	UPDATYEAR	9(4)	BE			
23	Month	UPDATMONTH	9(2)				

Contents of Public Utility File

No	Item	Field Name	Data	Unit	Code Index	Checking	Remarks
	(Identifier)						
1	Start Node	STARTNO	9(7)				
2	End Node	ENDNO	9(7)				
3	Sequential No.	SEQNO	9(1)				
	(Place)						
4	District	DISTRICT	9(2)		1	CMC	
5	Street	STREET	9(6)		2	CMC	
6	Distance from Start Node	DISTANCE	9(4)	M			Starting point
7	Segment Length	SEGLENGTH	9(4)	M			
	(Location/Existence)						
8	Drain Pipe	DRAIN	X(7)		17		Drainage for road
9	Electricity Circuit	ELECTRCTY	X(7)		17		
10	Telephone Circuit	TELEPHONE	X(7)		17		
11	Water Supply Pipe	WATERSPLY	X(7)		17		
12	Gas Pipe	GAS	X(7)		17		
13	Fuel Pipe	FUEL	X(7)		17		
	(Records)						
14	Free Comments	COMMENT	X(30)				
15	Updated Year	UPDATYEAR	9(4)	BE			
16	Month	UPDATMONTH	9(2)				

Contents of Buried Facility File

No	Item	Field Name	Data	Unit	Code Index	Checking	Remarks
	(Identifier)						
1	Start Node	STARTNO	9(7)				
2	End Node	ENDNO	9(7)				
3	Kind of Facility	FACILITY	9(2)		18	CMC	Water supply, electricity, etc.
4	Sequential No.	SEQNO	9(2)				
	(Place)						
5	District	DISTRICT	9(2)		1	CMC	
6	Street	STREET	9(6)		2	CMC	
7	Distance from Start Node	DISTANCE	9(4)	M			Starting point
8	Segment Length	SEGLENGTH	9(4)	M			
	(Details)						
9	Detail Explanation	EXPLAIN	X(20)				Water main, etc.
10	Type of Duct	TYPDUCT	9(2)		19	CMC	Iron pipe, RC culvert, etc.
11	Dimension	DIMENSION	X(20)				400, B 3000 x H 3000, etc.
12	Position: Surface Use	SURFUSE	9(2)		20	CMC	Carriageway, footpath, etc.
13	Dist. from Left Edge of ROW	DISTLEFT	9(6.2)	M			
14	Covering	COVER	9(6.2)	M			
15	Installed Year	INSTLYEAR	9(4)	BE			
16	Drawings Number	DRAWNO	X(20)				
	(Records)						
17	Free Comments	COMMENT	X(30)				
18	Updated Year	UPDATYEAR	9(4)	BE			
19	Month	UPDATMONTH	9(2)				

Contents of Intersection File

No	Item	Field Name	Data	Unit	Code Index	Checking	Remarks
	(Identifier)						
1	Node	NODE	9(7)				
	(Place)						
2	District	DISTRICT	9(2)		1	CMC	
3	Intersection Name or Location	INTERNAME	X(20)				
	(Type of Intersection)						
4	No. of Intersecting Legs	LEG	9(1)				
5	Type of Intersection	TYPE	9(1)		21	CMC	At grade, round-about, flyover, interchange, etc.
6	Existence of Traffic Control Facilities	CONTROL	9(1)		22	CMC	Signal, flashing light, sign, etc.
7	Lighting Conditions	CNDLIGHT	9(1)		13	CMC	Good, fair, poor, etc.
	(Traffic Accident)						
8	No. of Traffic Accidents	ACCIDENT	9(3)				
9	Fatalities	FATARITY	9(3)				
10	Injuries	INJURY	9(3)				
	(Records)						
11	Free Comments	COMMENT	X(30)				
12	Updated Year	UPDATYEAR	9(4)	BE			
13	Month	UPDATMONTH	9(2)				

Contents of Intersection Leg File

No	Item	Field Name	Data	Unit	Code Index	Checking	Remarks
	(Identifier)						
1	Node	NODE	9(7)				
2	Adjacent Node	ADJNODE	9(7)				
	(Place, Traffic Reg'n)						
3	District	DISTRICT	9(2)		1	CMC	
4	Street	STREET	9(6)		2	CMC	
5	Regulation of Direction	REGULATION	9(2)		9	CMC	One-way/two-way
6	Prohibition of Turning	PROHIBITN	9(3)		23		
	(Existence of Facilities)						
7	Median Strip	MEDIAN	9(1)		11	CMC	
8	Channel (L)	CHANNELL	9(2)		24	CMC	Incl. island, marking, etc.
9	(R)	CHANNELR	9(2)		24	CMC	
10	Pedestrian Crossing	PEDCROSS	9(1)		11	CMC	Marking
11	Pedestrian Bridge	PEDBRIDGE	9(1)		11	CMC	
12	Signal for Pedestrian	PEDSIGNAL	9(1)		11	CMC	
	(Flow-in Lanes)						
13	No. of Lanes (Left Turn)	LANEILT	9(2)				Exclusive
14	(Straight Through)	LANEIST	9(2)				Include mixed lane
15	(Right Turn)	LANEIRT	9(2)				Exclusive
16	(Sub Total)	LANEITO	9(2)			=13+14+15	Public traffic
17	(Bus Lane)	LANEIBS	9(2)				Exclusive
	(Flow-out Lanes)						
18	No. of Lanes (Sub Total)	LANEOTO	9(2)				Public traffic
19	(Bus Lane)	LANEOBS	9(2)				Exclusive
	(Whole Lanes)						
20	Total No. of Lanes (Traffic Control Facilities)	LANETOTAL	9(2)			=16+17+18+19	For flow-in traffic
21	No. of Traffic Signals	NOSIGNAL	9(1)				No. of face
22	Arrang't of Traffic Signals	ARNGSIGNAL	X(9)		25		
23	Cycle Time of Signal	CYCLETIME	9(3)	Sec.			
24	No. of Phase	PHASE	9(1)				
25	No. of Flashing Lights	FLASHLIGHT	9(1)				
26	No. of Regulatory Signs	SIGNREG	9(1)				
	(Traffic Data)						
27	Queue Length	QUELENGTH	9(4)	M			
	(Records)						
28	Free Comments	COMMENT	X(30)				
29	Updated Year	UPDATYEAR	9(4)	BE			
30	Month	UPDATMONTH	9(2)				

Contents of Code File

No	Item	Field Name	Data	Unit	Code Index	Checking	Remarks
	(Identifier)						
1	Code Index	CODEIND	9(3)				
2	Code Number	CODE	9(7)				
	(Content's)						
3	Content's	CNTNT	X(40)				

"Control Link" Coding Sheet(A)

(Example)

Coded by ; JICA

Date ; '85 1 9 1 15

1.	STARTNO	: 117000 :		
2.	ENDNO	: 118000 :		
3.	DISTRICT	: 3 :		(1)
4.	STREET	: 16101 :		(2)
5.	CLASS	: 12 :		(3)
6.	ADMINIST	: 1 :		(4)
7.	CROSTYPE	: 12 :		(5)
8.	LNDUSEL1	: 20 :		(6)
9.	LNDUSEL2	: 13 :		(6)
10.	LNDUSER1	: 20 :		(6)
11.	LNDUSER2	: 13 :		(6)
12.	LNDUSFL1	: __ :	unknown	(6)
13.	LNDUSFL2	: __ :		(6)
14.	LNDUSFR1	: __ :		(6)
15.	LNDUSFR2	: __ :		(6)
16.	CROSSRDL	: 1 :		
17.	CROSSRDR	: 1 :		
18.	CROSSRAIL	: ____ : (M)	none	
19.	BUSROUTE	: 20 :		(7)
20.	BUSSTOP	: 1 :		
21.	PEDCROSS	: 1 :		
22.	BRIDGE	: 0 :		
23.	PEDBRIDGE	: 1 :		
24.	PAVETYPE	: 3 :		(8)
25.	TREE	: 2 :		(11)
26.	DRAIN	: 1 :		(11)
27.	ELECTRCTY	: 1 :		(11)
28.	TELEPHONE	: 1 :		(11)
29.	WATERSPLY	: 1 :		(11)
30.	GAS	: 2 :		(11)
31.	FUEL	: 2 :		(11)

◯ Shows Code Index

Coding Sheet for Control Link File (A)

"Control Link" Coding Sheet(B)

(Example)

Coded by ; JICA

Date ; '85/ 9/ 15

1.	STARTNO	: 1,1,7,0,0,0 :		
2.	ENDNO	: 1,1,8,0,0,0 :		
3.	LENGTH	: 3,8,9 : (M)		
4.	WIDROW	: 2,9,.,0,0 : (M)		
5.	AREAROW	: 1,1,2,8,1 : (M^2)		
6.	LANEPTL	: 0 :		
7.	LANEPTR	: 6 :		
8.	LANEPTT	: 6 :		
9.	LANEBSL	: 1 :		
10.	LANEBSR	: 0 :		
11.	LANEBST	: 1 :		
12.	LANETOTAL	: 7 :		
13.	WIDCARL	: 0,.,0,0 : (M)		
14.	WIDCARR	: 2,2,.,0,0 : (M)		
15.	WIDCART	: 2,2,.,0,0 : (M)		
16.	WIDMED	: 0,.,0,0 : (M)		
17.	WIDFPL	: 3,.,5,0 : (M)		
18.	WIDFPR	: 3,.,5,0 : (M)		
19.	WIDSLDL	: 0,.,0,0 : (M)		
20.	WIDSLDR	: 0,.,0,0 : (M)		
21.	WIDTOTAL	: 2,9,.,0,0 : (M)		
22.	MARKLANE	: 1 :		(11)
23.	MARKEDGE	: 2 :		(11)
24.	MARKCURBL	: 2 :		(11)
25.	MARKCURBR	: 2 :		(11)
26.	FNCTYPL	: :	none	(12)
27.	FNCTYPR	: :	(	(12)
28.	FNCTYPM	: :	↓	(12)
29.	FNCLNGL	: 0 : (M)		
30.	FNCLNGR	: 0 : (M)		
31.	FNCLNGM	: 0 : (M)		

◯ Shows Code Index

Coding Sheet for Control Link File (B)

"Control Link"Coding Sheet(C)

(Example)

Coded by ; JICA

Date ; '85 1 9 1 15

1.	STARTNO	: 1,1,7,0,0,0 :		
2.	ENDNO	: 1,1,8,0,0,0 :		
3.	REGULATION	: 1,2, :	(9)	
4.	PRHPARKL	: 3, :	(10)	
5.	PRHPARKR	: 3, :	(10)	
6.	SIGNREG	: 5, :		
7.	SIGNWRN	: 0, :		
8.	SIGNGUID	: 1, :		
9.	SIGNTOTAL	: 6, :		
10.	SIGNAL	: 1, :		
11.	VOLCAR	: 5,9,8,3,4, : (Veh/12H)		
12.	VOLMC	: 2,5,5,8,6, : (Veh/12H)		
13.	VOLPEAK	: 5,5,0,7, : (Veh/H)		
14.	SPEED	: 2,5, : (Km/H)		
15.	CAPACITY	: 6,2,8,5,2, : (Veh/12H)		
16.	CONGESTION	: 1,.,1,4, :		
17.	ACCIDENT	: 2, :		
18.	FATALITY	: 0, :		
19.	INJURY	: 1, :		
20.	CNDSURF	: 3, :	(13)	
21.	CNDMARK	: 3, :	(13)	
22.	CNDLIGHT	: 2, :	(13)	
23.	FLOODREC	: 2,0, : (CM)		
24.	COMMENT	: CODING EXAMPLE :		
25.	UPDATYEAR	: 2,5,2,8, :		
26.	UPDATMONTH	: 9, :		

Shows Code Index

Coding Sheet for Control Link File (C)

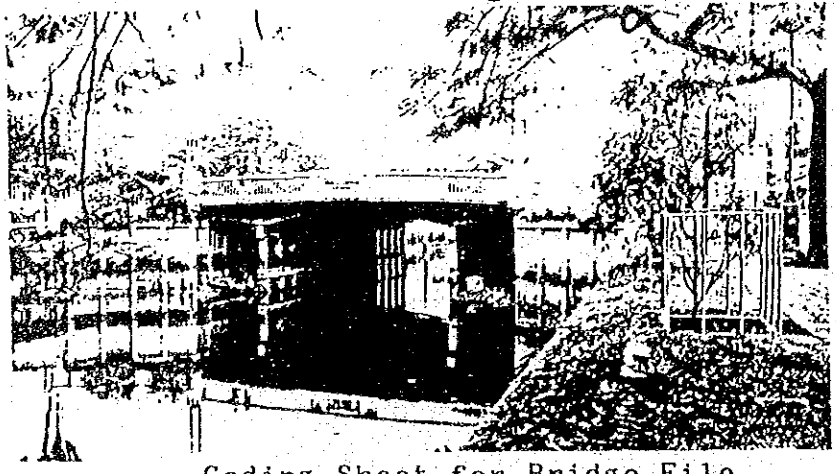
"Bridge"Coding Sheet

(Example) Coded by; JICA

Date ; '85 / 9 / 15

1.	STARTNO	: 140000 :		
2.	ENDNO	: 142000 :		
3.	SEQNO	: 1 :		
4.	DISTRICT	: 3 :	(1)	
5.	STREET	: 11.1008 :	(2)	
6.	BRNAME	: NAPAWONA BRIDGE :		
7.	PURPOSE	: 1 :	(14)	
8.	TYPE	: 22 :	(15)	
9.	LENGTH	: 21.00 : (M)		
10.	NOSPAN	: 3 :		
11.	LANE	: 6 :		
12.	WIDCAR	: 15.00 : (M)		
13.	WIDFPL	: 1.00 : (M)		
14.	WIDFPR	: 1.00 : (M)		
15.	CLEARV	: 1.50 : (M)		
16.	CLEARH	: 12.00 : (M)		
17.	LIGHT	: 1 :	(11)	
18.	CONSTYEAR	: 2503 :		
19.	CONSTRCTR	: NAPA INTERNATIONAL :		
20.	CONSTCOST	: 5,120,00 : (Baht)		
21.	REPWORK	: 3 :	(16)	
22.	REPYEAR	: 2525 :		
23.	REPNTYEAR	: :		
24.	CONDITION	: 2 :	(13)	
25.	COMMENT	: CODING EXAMPLE :		
26.	UPDATYEAR	: 2528 :		
27.	UPDATMONTH	: 9 :		

◯ Shows Code Index



Coding Sheet for Bridge File

"Pedestrian Bridge" Coding Sheet

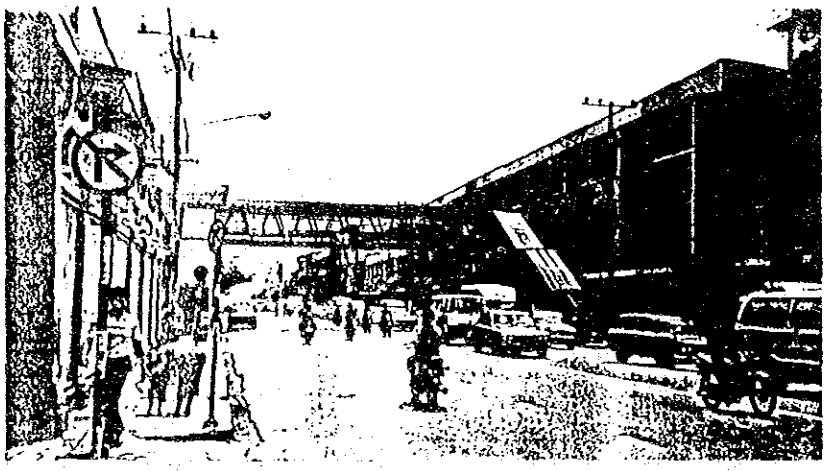
(Example)

Coded by; JICA

Date ; '85 / 9 / 15

1.	STARTNO	: 1.1.2.0.0.0 :		
2.	ENDNO	: 1.1.3.0.0.0 :		
3.	SEQNO	: 1 :		
4.	DISTRICT	: 3 :	(1)	
5.	STREET	: 1.8.1.0.0.6 :	(2)	
6.	PDBRNAME	: KASET SUK BLDG. . . . . :		
7.	TYPE	: 1.3 :	(15)	
8.	LENGTH	: 2.0 . 0.0 : (M)		
9.	NOSPAN	: 1 :		
10.	WIDEFECT	: 2 . 6.0 : (M)		
11.	CLEARV	: 4 . 7.0 : (M)		
12.	CLEARH	: 1.8 . 5.0 : (M)		
13.	LIGHT	: 1 :	(11)	
14.	CONSTYEAR	: 2.5.2.2 :		
15.	CONSTRCTR	: KASET CORP. . . . . :		
16.	CONSTCOST	: . . . 6.5.3.3.0.0 : (Baht)		
17.	REPWORK	: 4 :	(16)	
18.	REPYEAR	: 2.5.2.7 :		
19.	REPNTYEAR	: 2.5.2.7 :		
20.	CONDITION	: 1 :	(13)	
21.	COMMENT	: CODING EXAMPLE IN FICTION . . . . :		
22.	UPDATYEAR	: 2.5.2.8 :		
23.	UPDATMONTH	: 9 :		

◯ Shows Code Index



Coding Sheet for Pedestrian Bridge File

"Pavement" Coding Sheet
(Example)

Coded by ; JICA
Date ; '851 9 1/5

1. STARTNO : 117000 :
2. ENDNO : 118000 :
3. SEQNO : 1 :
4. DISTRICT : 3 : (1)
5. STREET : 161010 : (2)
6. DISTANCE : 0 : (M)
7. SEGLENGTH : 389 : (M)
8. TYPCAR : 3 : (8)
9. TYPFPL : 4 : (8)
10. TYPFPR : 4 : (8)
11. TYPMED : : none (8)
12. TYPSLD : : ½ (8)
13. AREACAR : 8558 : (M^2)
14. AREAFPL : 1362 : (M^2)
15. AREAFPR : 1362 : (M^2)
16. AREATOTAL : 11282 : (M^2)
17. CONSTYEAR : 2523 :
18. CONSTRCTR : PLENCHIT CO. :
19. CONSTCOST : 1500000 : (Baht)
20. CNDCAR : 3 : (13)
21. COMMENT : CODING EXAMPLE IN FICTION :
22. UPDATYEAR : 2528 :
23. UPDATMONTH : 9 :

◯ Shows Code Index

Coding Sheet for Pavement File

"Public Utility" Coding Sheet

(Example)

Coded by ; JICA

Date ; '85/9/15

1.	STARTNO	: 1,1,7,0,0,0 :	
2.	ENDNO	: 1,1,8,0,0,0 :	
3.	SEQNO	: 2 :	
4.	DISTRICT	: 3 :	(1)
5.	STREET	: 1,6,1,0,1,0 :	(2)
6.	DISTANCE	: 1,4,1 : (M)	
7.	SEGLENGTH	: 4,2 : (M)	
8.	DRAIN	: 0,1,0,0,0,1,0 :	(17)
9.	ELECTRCTY	: 1,0,0,0,0,0,1 :	(17)
10.	TELEPHONE	: 1,0,0,0,0,1,1 :	(17)
11.	WATERSPLY	: 0,1,1,0,0,1,0 :	(17)
12.	GAS	: 0,0,0,0,0,0,0 :	(17)
13.	FUEL	: 0,0,0,0,0,0,0 :	(17)
14.	COMMENT	: CODING EXAMPLE IN FICTION . . . . :	
15.	UPDATYEAR	: 2528 :	
16.	UPDATMONTH	: 9 :	

◯ Shows Code Index

Coding Sheet for Public Utility File

"Buried Facility" Coding Sheet

(Example)

Coded by ; JICA

Date ; '86 7 13

1. STARTNO : 117000:
2. ENDNO : 118000:
3. FACILITY : 40: (18)
4. SEQNO : 2:
5. DISTRICT : 3: (1)
6. STREET : 16101O: (2)
7. DISTANCE : 141: (M)
8. SEGLENGTH : 42: (M)
9. EXPLAIN : WATER MAIN :
10. TYPDUCT : 12: (19)
11. DIMENSION : DIA 500 :
12. SURFUSE : 22: (20)
13. DISTLEFT : 35.00: (M)
14. COVER : 1.05: (M)
15. INSTLYEAR : 2518:
16. DRAWNO : WS-1358 TO WS-1371 :
17. COMMENT : CODING EXAMPLE IN FICTION :
18. UPDATYEAR : 2529:
19. UPDATMONTH: 8 :

◯ Shows Code Index

Coding Sheet for Buried Facility File

"Intersection" Coding Sheet

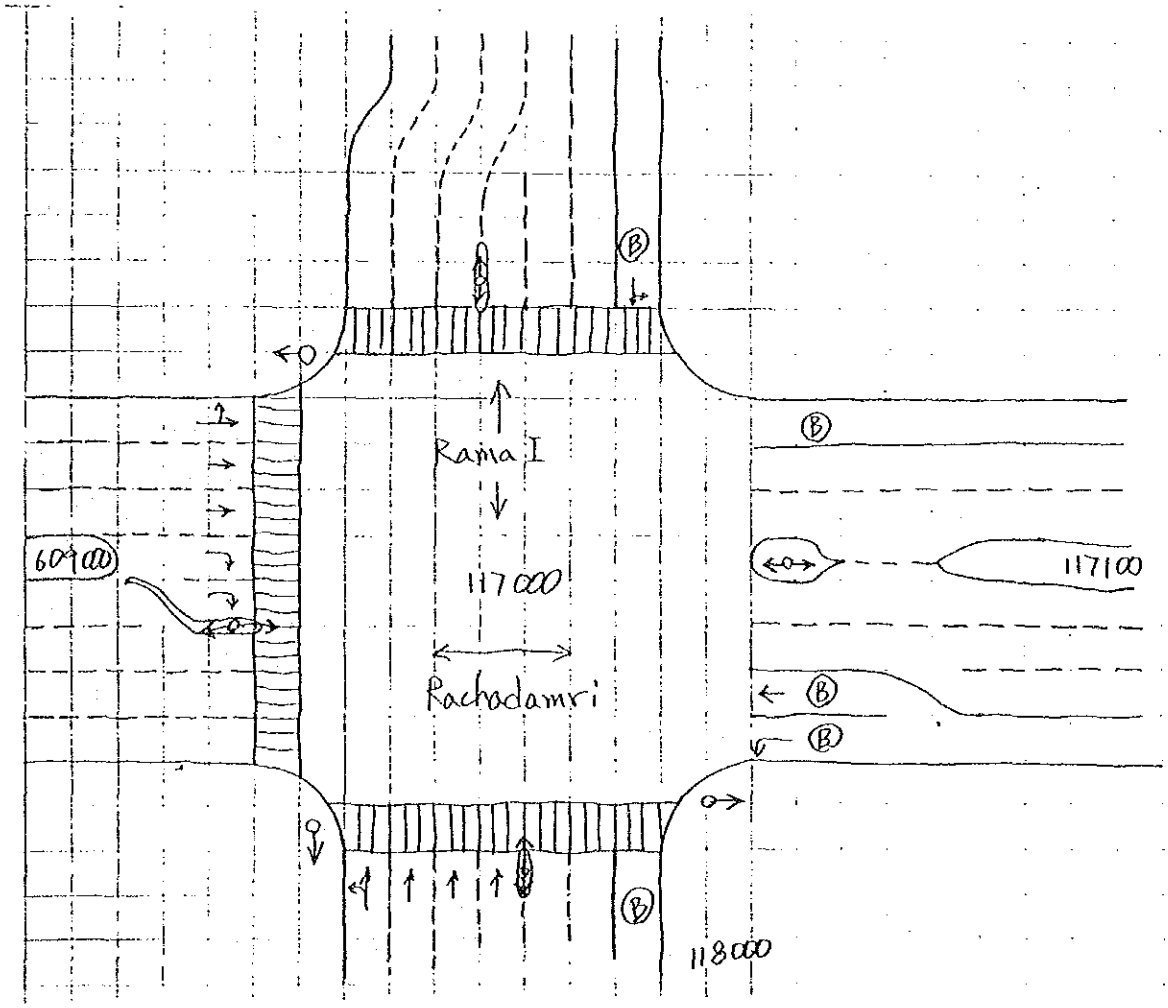
(Example)

Coded by ; JICA

Date ; '85 1 9 1 15

1. NODE : 1.1.7.0.0.0 :
2. DISTRICT : 3 : (1)
3. INTERNAME : RAMA I. RACHADAMRI : .
4. LEG : 4 :
5. TYPE : 1 : (21)
6. CONTROL : 1 : (22)
7. CNDLIGHT : 4 : (13)
8. ACCIDENT : 2 1 :
9. FATALITY : 0 :
10. INJURY : 1 0 :
11. COMMENT : CODING EXAMPLE IN FICTION :
12. UPDATYEAR : 2 5 2 8 :
13. UPDATMONTH : 9 :

◯ Shows Code Index



Coding Sheet for Intersection File

"Intersection Leg" Coding Sheet

(Example)

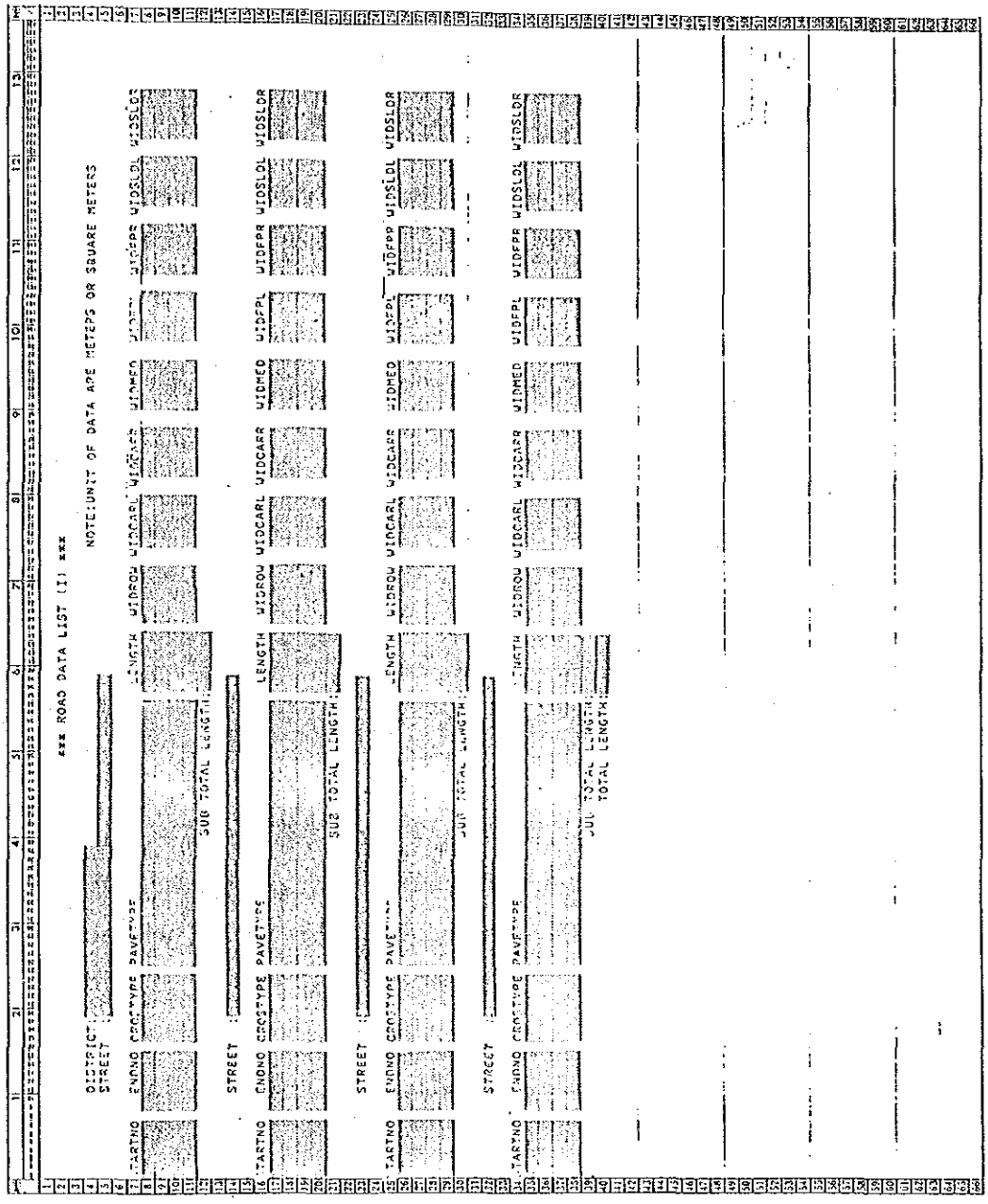
Coded by ; JICA

Date ; '851 9 1 15

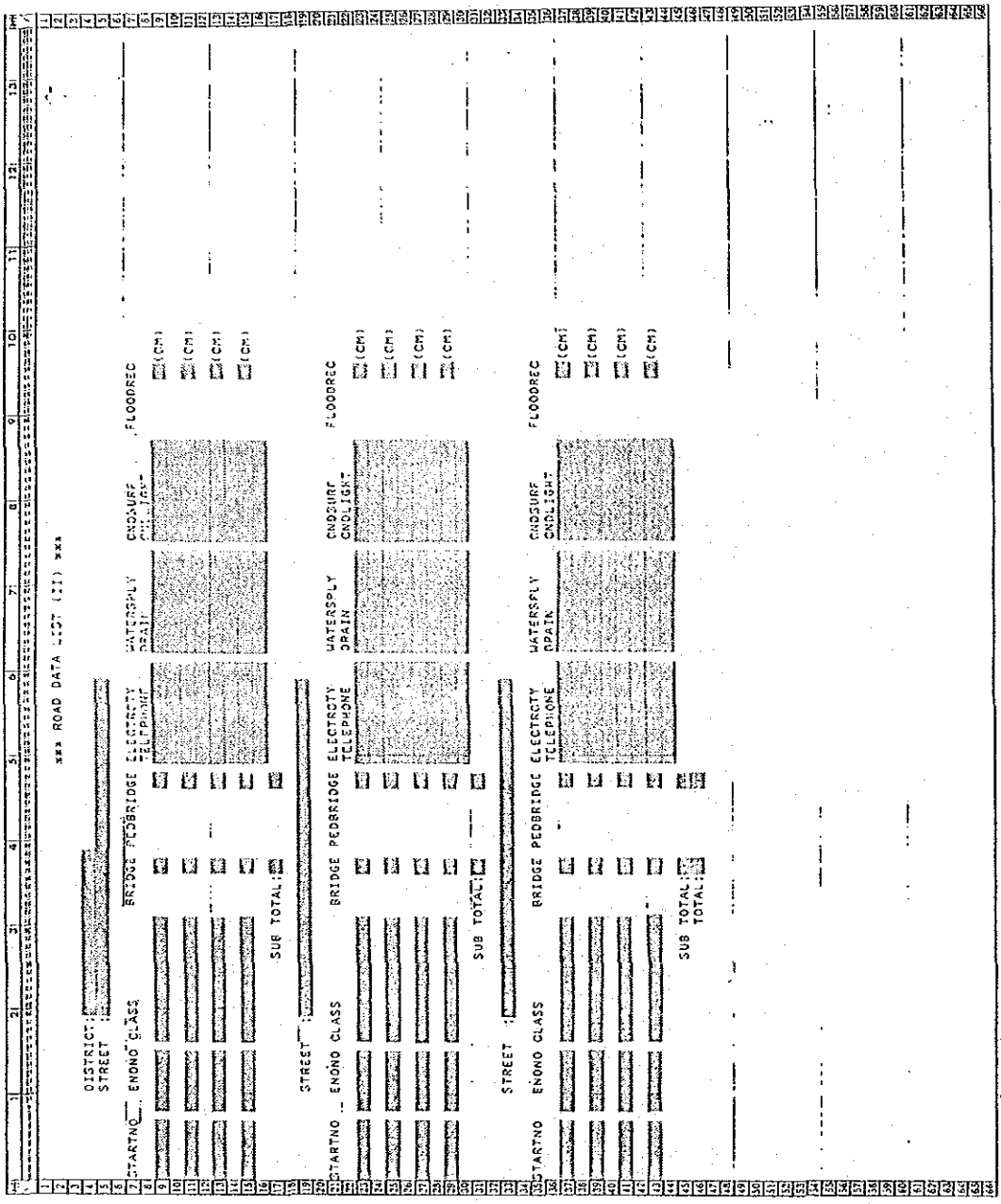
1. NODE	: 1,1,7,0,0,0 :		
2. ADJNODE	: 1,1,8,0,0,0 :		
3. DISTRICT	: 3 :	(1)	
4. STREET	: 1,6,1,0,1,0 :	(2)	
5. REGULATION	: 1,3 :	(9)	
6. PROHIBITN	: 1,1,1 :	(23)	
7. MEDIAN	: 2 :	(11)	
8. CHANNELL	: 1,3 :	(24)	
9. CHANNELR	: 1,3 :	(24)	
10. PEDCROSS	: 1 :	(11)	
11. PEDBRIDGE	: 1 :	(11)	
12. PEDSIGNAL	: 2 :	(11)	
13. LANEILT	: 0 :		
14. LANEIST	: 5 :		
15. LANEIRT	: 1 :		
16. LANEITO	: 6 :		
17. LANEIBS	: 0 :		
18. LANEOTO	: 0 :		
19. LANEOBS	: 1 :		
20. LANETOTAL	: 7 :		
21. NOSIGNAL	: 3 :		
22. ARNGSIGNAL	: 0,1,0,0,0,0,1,1,0 :	(25)	
23. CYCLETIME	: 85 : (Sec.)		
24. PHASE	: 4 :		
25. FLASHLIGHT	: 0 :		
26. SIGNREG	: 1 :		
27. QUELENGTH	: 380 : (M)		
28. COMMENT	: CODING EXAMPLE :		
29. UPDATYEAR	: 2528 :		
30. UPDATMONTH	: 9 :		

◯ Shows Code Index

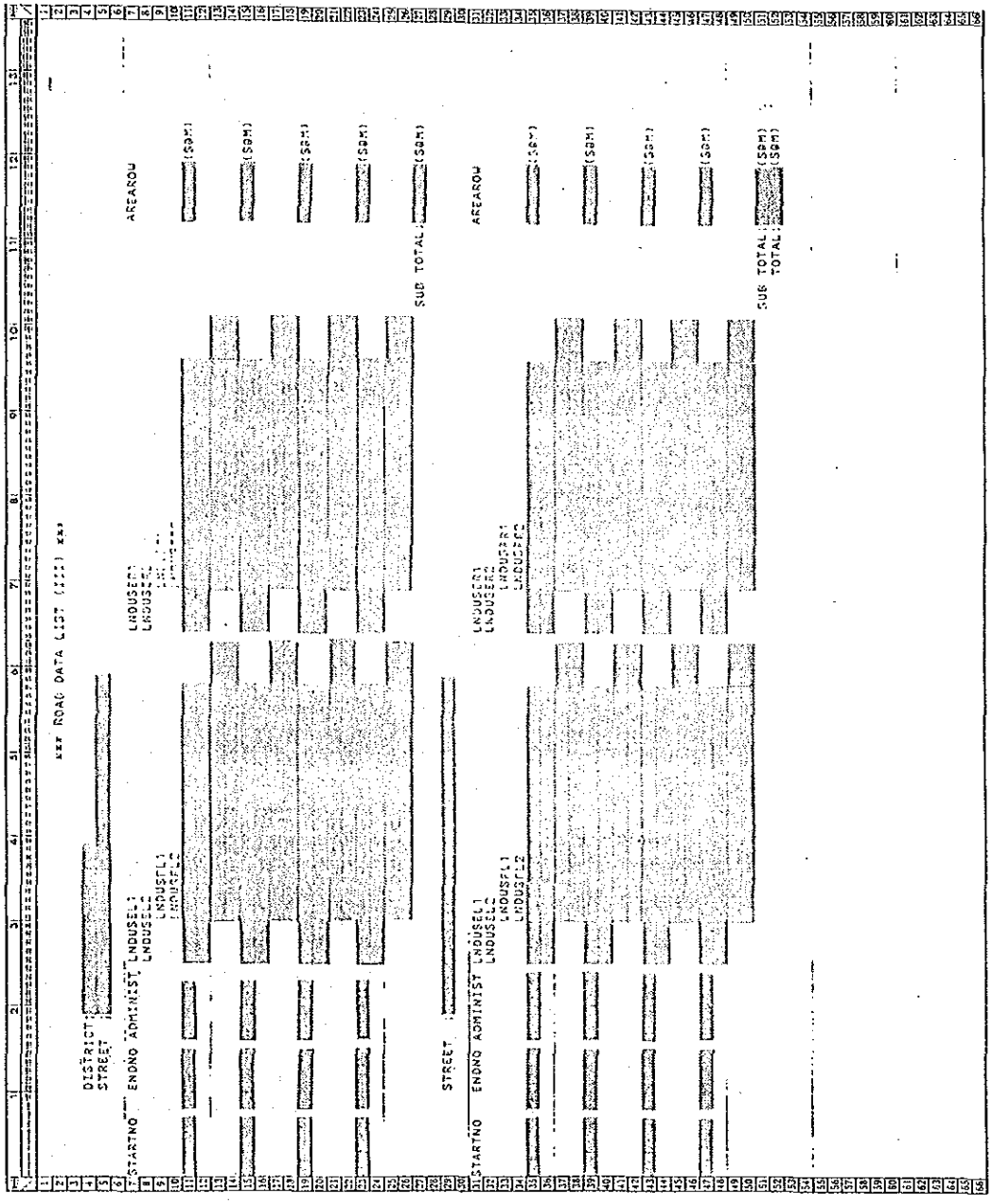
Coding Sheet for Intersection Leg File



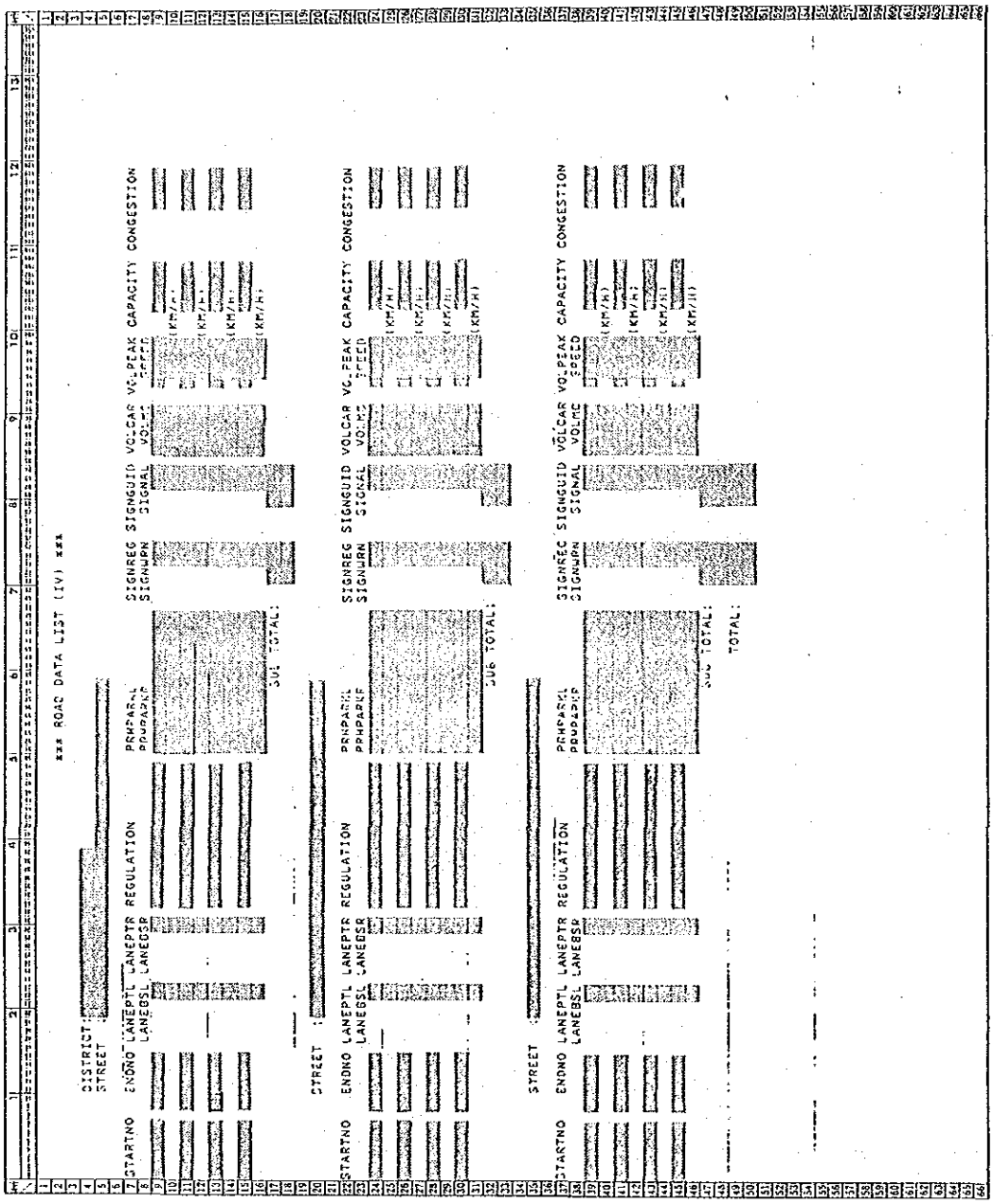
Output Form for Road Data List (I)



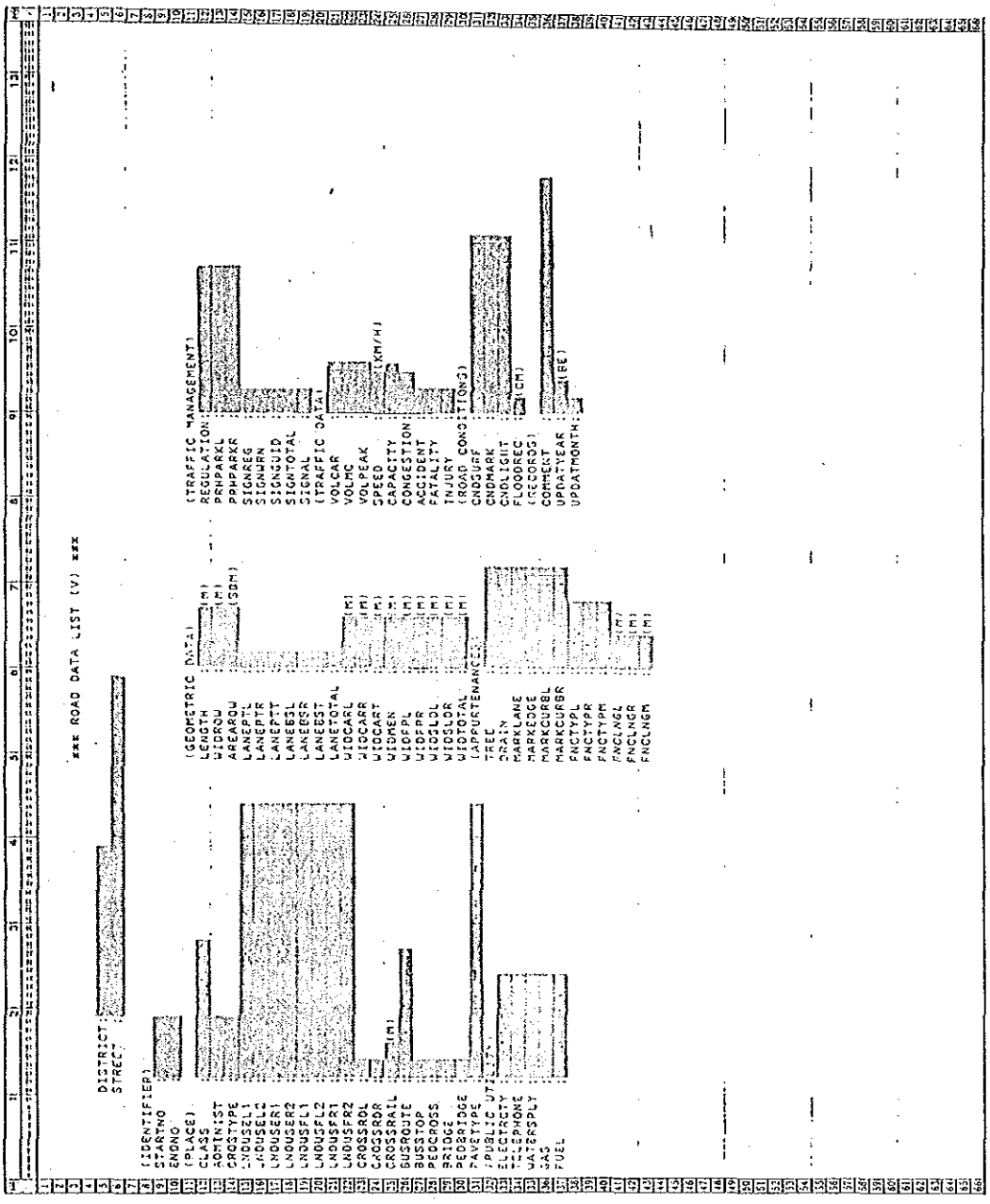
Output Form for Road Data List (II)



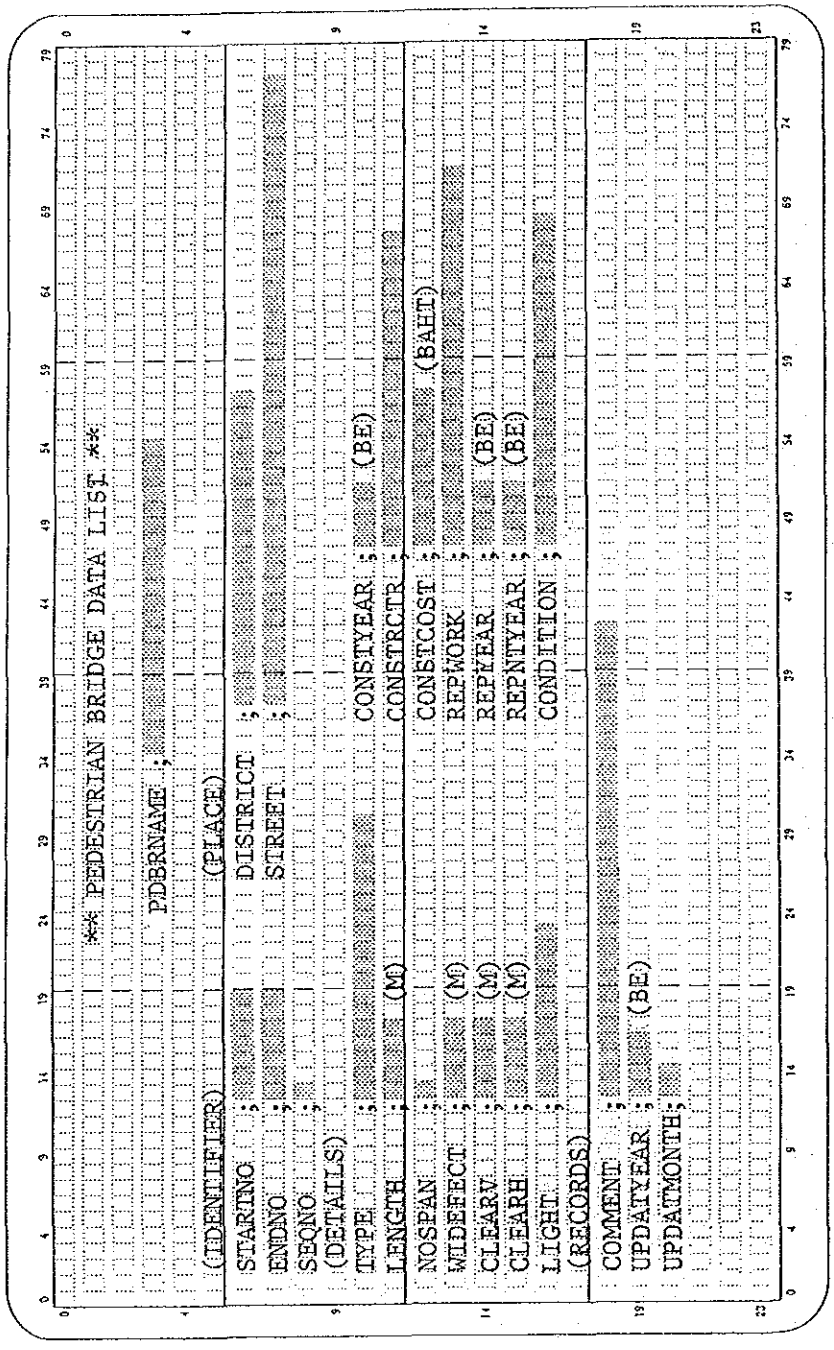
Output Form for Road Data List (III)



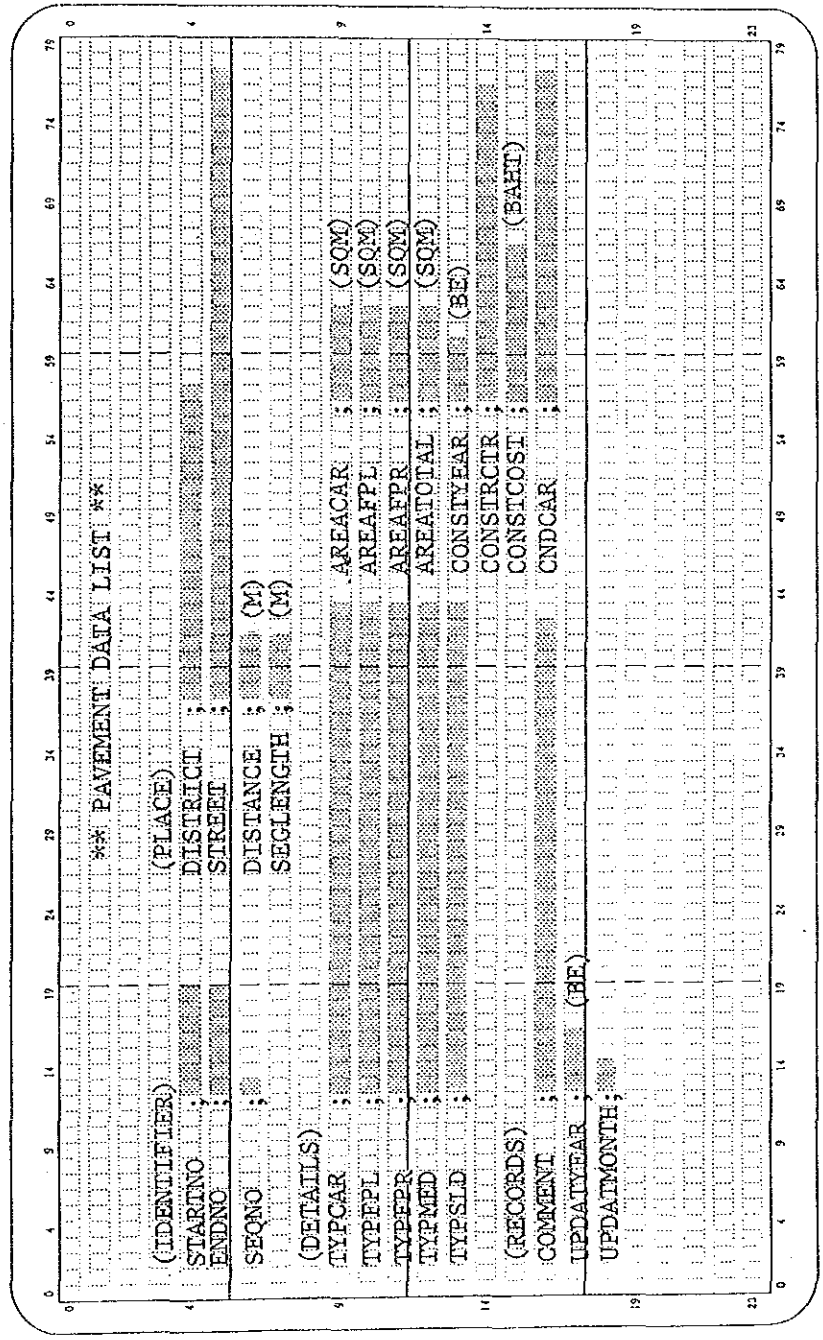
Output Form for Road Data List (IV)



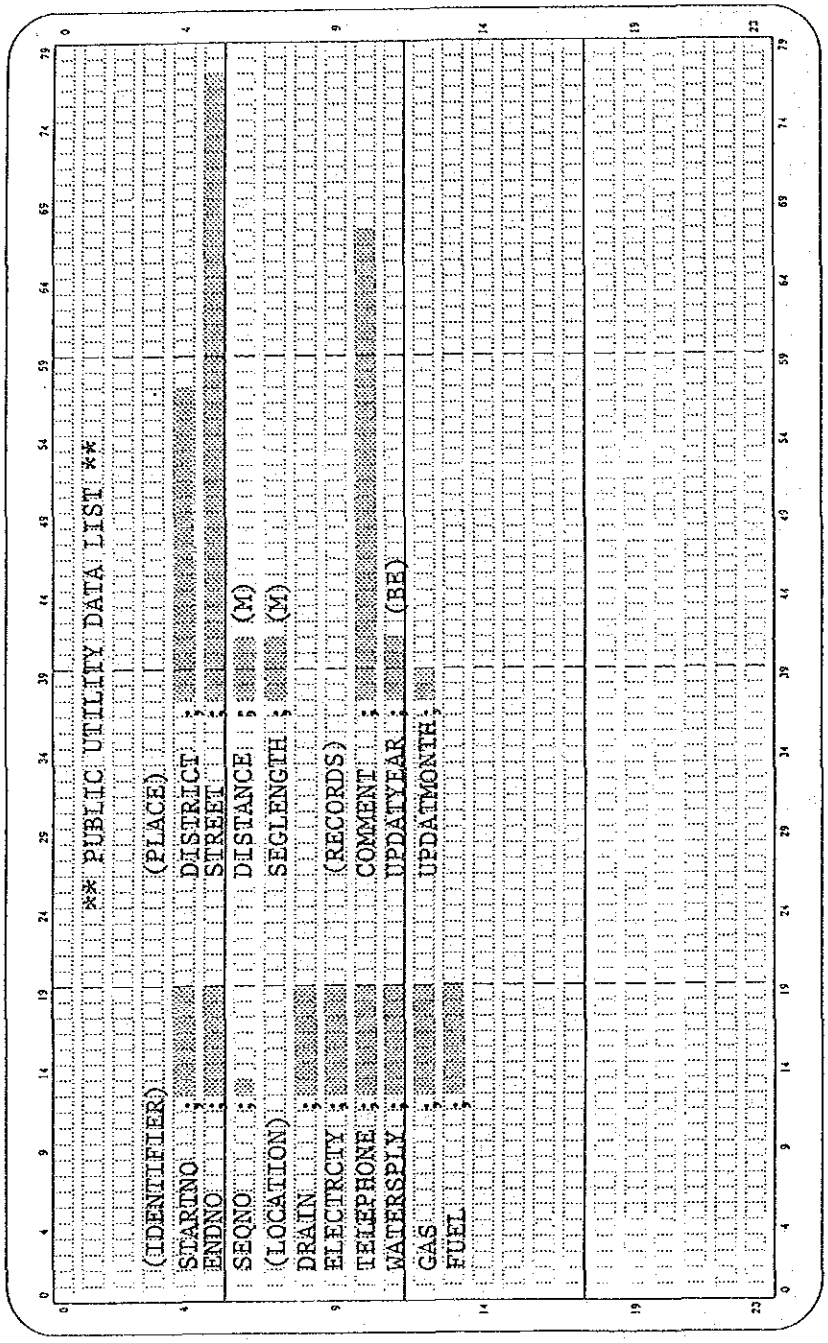
Output Form for Road Data List (V)



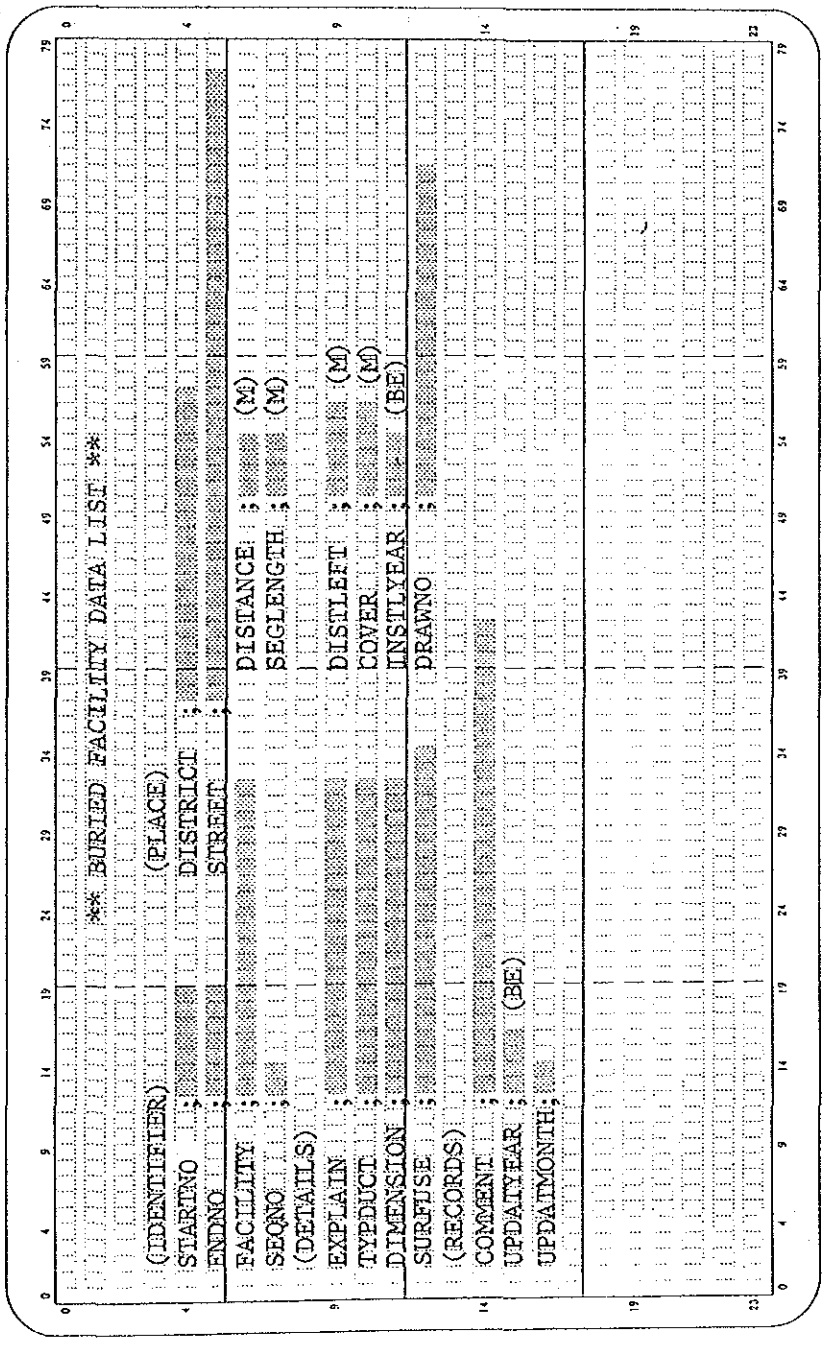
Output Form for Pedestrian Bridge



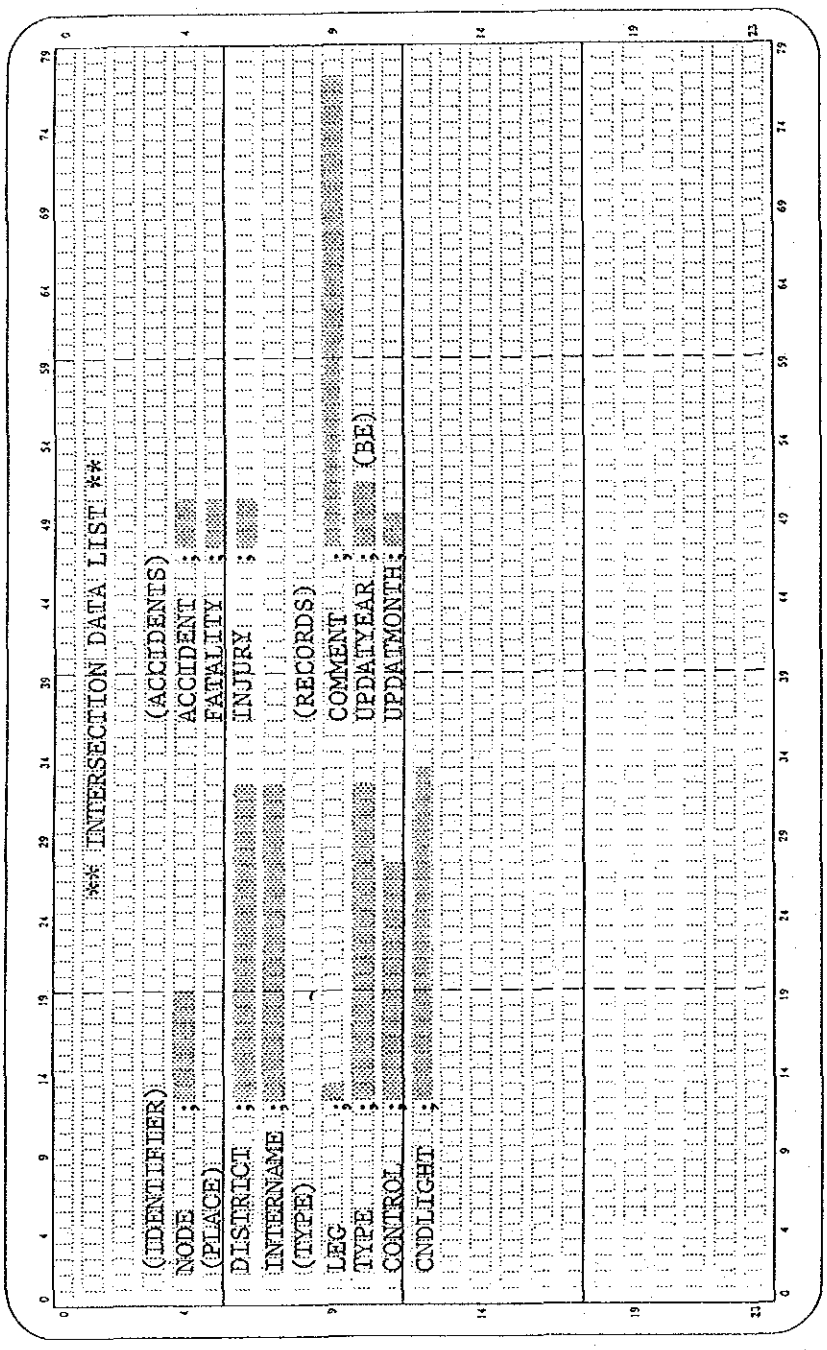
Output Form for Pavement



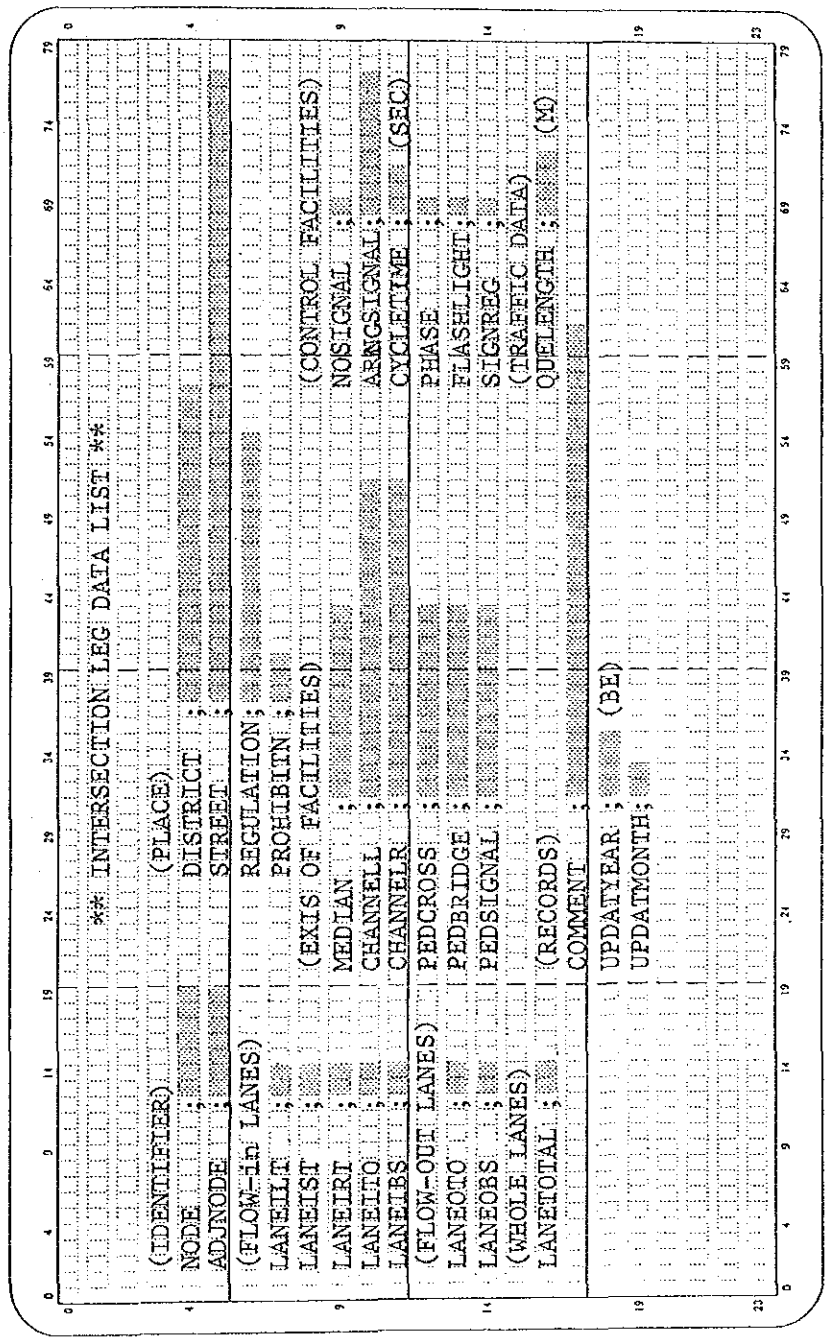
Output Form for Public Utility



Output Form for Buried Facility



Output Form for Intersection



Output Form for Intersection Leg

Contents of USERS MANUAL

USERS MANUAL consists of three chapters, which are explained as follows;

Chapter 1; PRELIMINARY KNOWLEDGE TO OPERATE THE METROS
- . Preliminary Knowledge on Hardware and software.
- . METROS what's ?
- . Data Base Files.
- . Definitions.

Chapter 2; OPERATIONS
- . Standard Processing by Output Interface Program.
- . Direct Use of dBASE II.

Chapter 3; APPENDICES
- . Road Network
- . Code Table
- . Application of METROS

Contents of SYSTEM MANUAL

SYSTEM MANUAL consists of six chapters, which is explained as follows;

Chapter 1; PRELIMINARY KNOWLEDGE TO MAINTAIN THE METROS
- . Preliminary Knowledge on Hardware and Software.
- . System Maintenance/Management Procedure.
- . Data Base Files.
- . Definitions.

Chapter 2; DATA MAINTENANCE WORKS.
- . Data Coding Methods.
- . Update (Append, Alter, Delete).
- . Error Check and Countermeasures.

Chapter 3; SYSTEM MAINTENANCE WORKS.
- . Road Network.
- . Code.
- . Data Base Recovery (Back-up, Recover).

Chapter 4; SYSTEM MANAGEMENT WORKS.
- . Data Base Management.
- . System Recovery.

Chapter 5; METROS PROGRAMS.
- . Structure of Programs.
- . Process Flow.
- . File Definitions.

Chapter 6; APPENDICES.
- . Road Network.
- . Code Table.
- . Coding Sheets.
- . Application of METROS.

AUTHORIZE DUTY AND RESPONSIBILITY

OF

DEPARTMENT OF PUBLIC WORKS

BANGKOK METROPOLITAN ADMINISTRATION

BY

MR. DAMRI RATANAWONG
DIRECTOR OF
DEPARTMENT OF PUBLIC WORKS

JULY 1985

Contents

Section 1

"The Administration Works of DPW"

1. History of DPW

During the old time before changing to Constitutional Monarchy, our country was an Absolute Monarchy and the Maintenance authority for capital city was the duty of Servicing Unit Municipality and established in 1898 under Ministry of Urban Affairs. Later, the King ordered to combine with Ministry of Interior on 1 August 1922 and changed the name. After changing the rule, government issued act of administration Bangkok in 1926 by settle up and assigned some part of administration officer from Ministry of Interior to attend for administration Bangkok on 1 April 1927. And the name of Servicing Unit Municipality was modified as Public Works Section from 13 March 1928 and moved office from Palace of Pracheen Kittibordee to combine in office of Municipality at Sao Chingcha. The development of country was increased and wider expansion, therefore Bangkok Municipality was improved Public Works Section and promoted to Public Works Department and then changed the name as Public Works Department. Due to improvement the new administration, MOI ordered on 22 March 1974 to transfer this department to be under BMA.

In present, DPW was improved and changed new administration by relevant Act of BMA Administration in 1975 and Royal Decree of Government Authority in 1977 by using as the old name of Department of Public Works.

2. Authorize Duty of DPW

According to the Royal Decree was separated the official duties to manage Bangkok Metropolis in 1977 section 29, 30 and 31 which was mentioned as following:

2.1 "DPW" has authority of civil work, design, construction and maintenance, construction control and right of way and land in Bangkok Metropolis, under the responsibility of "Director" and control by Permanent Secretary of BMA, this Department is composed of these divisions;

1. Secretary Office
2. Public Works Planning Sub-Division,
3. Right of Way and Land Division,
4. Design Division,
5. Construction Control Division,
6. Construction and Maintenance Division, and
7. Building Control Division

2.2 The Office of Secretary

This office is responsible for control, examination, providing, follow up the procedure including advisor duty and solution the problems of filing, financial, personnel work, handle the constructor agreement of improvement the BMA construction, accumulative statistic, check the documents before sending to directors for approval, public relations for DPW and handle other duties which excluded for other Division.

Documentation Section:
responsible for receiving and sending official document to distribute the concerning divisions, correspondence, present DPW news to public, press release announcement.

Contract Section:
responsible for construction tender under DPW procedure and revising construction agreement before deliver to MOI for approval and separated into 2 sub-sections.

1. Administration Sub-Section which is concerned with budget, financial, accounting, report conclude statistic construction and purchasing office equipment.
2. Employment and Purchasing the Office Equipment Sub-Section provide for tender within the annual budget of DPW.

Finance Section:
responsible for tender within the annual budget of DPW, payment of salary, living allowance, control and install electricity for public which is out of project, fine the people who destroy public utility, control repairing cost road which was digging by MEA, MWWA and TOT.

Personnel Section:
responsible for control and employment officers for DPW.

1. Administrative Sub-Section which is concerned with filing, general administration, budget, financial and accounting.
2. Officer Sub-Section is responsible for collecting survey data for personnel administrative working, preparing man power, employment, consideration and promoting the rank of officer.

2.3 Public Works Planning Sub-Division

The duty is responsible for concluding projects, proceeding plan of all sections in DPW, arrangement the statistic and evaluation procedure including planning project of DPW and separating the duties as following.

1. Administration Section which is composed of filing, budgetary, financial, accounting, handle for vehicle and place of DPW.
2. Public Works Planning Section which is composed of 2 sub-sections.
   2.1 Administrative Work which handle for filing and general working, financial, procurement, take care for place and vehicle of DPW.
   2.2 Survey and Planning Work which carry out survey and accumulate data for utility of arrangement the plan and scope of work for DPW, coordinating civil work with other section.

3. Standard Cost Section
   3.1 Standard of Construction Cost Price Sub-Section 1 handle for assisting the tender committee to find out construction material standard price for consideration the medium price of construction, preparing manual of construction material and particular duty is building construction.
   3.2 Standard of Construction Cost Price Sub-Section 2 handle for same duty as the above section about construction except building construction.

2.4 Right of Way and Land Acquisition Division

The duty is responsible for

- examine public boundary area
- maintenance public area
- control outside door advertising board in public area
- survey land for utility of construction and stake out a boundary for construction road, drainage pipe, footpath and building
- preparing details map and survey for constructing new road
- reimbursement cost of land

This division is separated into following sections:

1. Survey and Mapping Sub-Division
   - 1.1 Administration Section
     handle for filing, general administration, budgetary, financial,accounting, procurement of survey and mapping.
   - 1.2 Survey and Mapping Section 1
     handle for stake out a boundary of road, trok, soi, ditch, canal, drainage pipe, footpath, bridge. To stake out boundary for improvement public utility such as MEA, MWWA, TOT. Preparing detail map for design and improvement including cooperation with district office of Pranakorn, Pomprab, Dusit, Phayathai, Huay Khwang, Bangkapi, Bangkhen, Minburi and Nongchok.
   - 1.3 Survey and Mapping Section 2
     handle for duty as the above section but responsible for area of Bangrak, Samphantawong, Pathumwan, Yannawa, Phrakanong and Latkrabang.
   - 1.4 Survey and Mapping Section 3
     handle for duty as the above section but responsibility in area of Thonburi (old).

2. Land Acquisition Sub-Division
   - 2.1 Administration Section
     handle for filing and general work for budgetary, financial, accounting and procurement of this section including history filing of Bangkok Metropolis about Right of Way and Land.
   - 2.2 Land Acquisition Section 1
     handle for set up standard price, examination quality and calculate reimbursement to owner of land or building including cooperation with district office of Phranakorn, Pomprab, Dusit, Phayathai, Huay Khwang, Bangkapi, Bangkhen and Nongchok.
   - 2.3 Land Acquisition Section 2
     handle for duty as same as the above section but responsibility is

area of Bangrak, Samphantawong, Pathumwan, Yannawa, Prakanong and Latkrabang.

2.4 Land Acquisition Section 3
handle for duty as same as the above section but responsibility area is Thonburi (old).

2.5 Design Division

This division is responsible for proceeding construction, design, arrangement details of construction of road or drainage pipe or bridge or dike and public utility of Bangkok Metropolis, examination the plan of construction, check price of construction cost to prepare tender for construction public utility such as the concerning of MEA, MWWA, TOT. Consideration and approval for public construction which proceed by relevant BMA design regulation. Working for consultant of other section about technical construction. The responsibility of each organizational unit is shown as follows;

1. Building Design Sub-Division
   1.1 Administration Section is responsible for filing, general work of budgetary, financial, accounting and procurement of this section preparing details and document for construction, printing original plan for keeping.
   1.2 Architecture Section 1 is responsible for survey, preparing building plan, design and drawing architectural work, advisor for construction problem. The responsibility area is Phranakorn, Dusit, Phayathai, Huay Khwang, Bangkapi, Bangkhen, Minburi, Nongchok.
   1.3 Architecture Section 2 is responsible for duty as same as the above section but responsibility area is Bangrak, Samphantawong, Pathum-wan, Yannawa, Prakanong, Latkrabang.
   1.4 Architecture Section 3 is responsible for duty as same as the above section but responsibility area is Thonburi (old).
   1.5 Engineering Section is responsible for survey, calculation and design building structure, examination old building structure which additional construction or repairing, examination engineering details for other section, design sanitary system or electricity system, advisor and solution problem while under construction.
   1.6 Interior Decoration Section
      - Interior design 1 handle for survey, design, drawing and arranging master plan, decoration interior of building.
      - Interior design 2 handle for design, drawing and decoration

for special activity boot for ceremony.

1.7 Cost Estimation Section is responsible for estimation building construction cost of BMA including architecture, engineering, and interior decoration.

2. Road Design Sub-Division

2.1 Administration Section handle for filing and general work for budgetary, financial, accounting, procurement of this section including preparation details and document for employment constructor of way and other structure.

2.2 Road Design Section 1 handle for survey, design drawing, set up items of construction of road or drainage pipe or bridge or dike and tunnel. Advisor and solution problem for the design plan while constructing. Cooperation with public utility responsibility office and responsible area is Phranakorn, Pomprab, Dusit, Phayathai, Bangkapi, Bangkhen, Minburi and Nongchok.

2.3 Road Design Section 2 handle for duty as same as above section but responsible area is Bangrak, Minburi, Pathumwan, Yannawa, Phrakanong and Latkrabang.

2.4 Road Design Section 3 handle for duty as same as above section but responsible area is Thonburi (old).

2.5 Cost Estimation Section handle for estimation price of construction way and structure (except building) of BMA including estimation payment period of constructor agreement.

3. Material and Research Sub-Division

3.1 Administration Section handl e for filing and general work of budgetary, financial, accounting and procurement of this section.

3.2 Material and Research Section 1 handle for examination material quality for road construction, drainage pipe, building and other construction material of BMA by analyse and research in laboratory such as testing density of material for construction road, parking. Responsibility area is Phranakorn, Pomprab, Dusit, Phayathai, Huay Khwang, Bangkapi, Bangkhen, Minburi and Nongchok.

3.3 Material and Research Section 2 handle for duty as same as above section. Responsibility area is Bangrak, Samphantawong, Pathumwan, Yannawa, Prakanong and Latkrabang.

3.4 Material and Research Section 3 handle for duty as same as above section. Responsibility area is Thonburi (old).

2.6 Construction Control and Supervision Division

This division is responsible for control construction of DPW to proceed as

same as plan and agreement including construction control for other government office which require the cooperation. Contacting with concern agency and public in area of site construction.

1. Administration Section handle for filing and general work for budgetary, financial, accounting and procurement of this section including printing, copy.
2 Construction Control Section 1 handle for construction control as same as plan of DPW, cooperating with other government office about installment of electric pole in area of Khlongsarn, Bangkhunthien, Thonburi and Ratburan
3. Construction Control Section 2 handle for duty as same as above section. Responsibility area is Bangkok Yai, Bangkok Noi, Talingchan, Phaseecharoen and Nongkhaem.
4. Construction Control Section 3 handle for duty as same as above section. Responsibility area is Bangkhen, Phranakorn, Dusit and Pomprab.
5. Construction Control Section 4 handle for duty as same as above section. Responsibility area is Samphantawong, Bangrak, Yannawa, Pathumwan.
6. Construction Control Section 5 handle for duty as same above section. Responsibility area is Phayathai, Bangkapi, Minburi, Huay Khwang.
7. Construction Control Section 6 handle for duty as same as above section. Responsibility area is Phrakanong, Latkrabang, Nongchok.

2.7 Construction and Maintenance Division

This division will proceed construction about road, trok, soi, footpath, gutter and rehabilitation bridge. Maintenance and improvement monument, index name board of road or trok or soi including government announcement board. Taking care instrument and vehicle for construction work.

1. Administration Section handle for filing and general work for budgetary, financial, accounting and procurement of this division.
2. Public Utility Coordination Section handle for coordinator of public utility plan and project. Follow up and accelerating of repairing road, trok, soi and footpath which is effected from improvement and installment of water pipe, electric cord, telephone and traffic signal system.
3. Road Construction and Maintenance Section 1 handle for improvement and rehabilitation road, trok, soi and footpath according to order of BMA no. 54/2522 dated on 31 June 1979 in area of Phranakorn, Pomprab, Phayathai, Dusit, Huay Khwang, Bangkapi, Bangkhen, Minburi, Nongchok.

4. Road Construction and Maintenance Section 2 handle for duty as same as above but responsibility area is Samphantawong, Bangrak, Pathumwan, Yannawa, Prakanong, Ladkrabang.
5. Road Construction and Maintenance Section 3 handle for duty as same as above responsiblity area is Thonburi, Khlongsarn, Bangkhunthien, Bangkok Noi, Bangkok Yai, Phaseecharoen, Nongkhaem, Talingchan, Ratburana.
6 Bridge Maintenance Section handle for survey, design and set up construction items for improvement and bridge rehabilitation including control this procedure by relevant government regulation.
7. Monument Maintenance Section handle for survey, and set up items for improvement and rehabilitation monument, fountain, index board name of road/trok/soi. Taking care special ceremony activity.
8. Mechanical Section handle for examination and repairing the mechanical instrument of DPW. Arrangement statistic of using gasoline, fuel and control registered property list of machinery.
9. Supply Section handle for purchasing construction material such as sand, stone, asphalt, gasoline for cars and control all list of them including acceleration procedure for nigh time working.
10. Plant Section handle for production of mixing asphalt in rehabilitation of traffic pavement improvement. Production construction material which is concrete such as for footpath. This section is divided into 4 sub-sections as the following;
    1) Production of mixing asphalt handle for production of mixing asphalt to use in traffic pavement improvement.
    2) Production of block footpath handle for production of concrete to use for footpath.
    3) Procurement handle for stock of material from production and consideration topurchaseconstructionmaterial such as concrete.
    4) Examination for asphalt mixing quality handle for examination the quality of asphalt to use for block footpath and rehabilitation traffic pavement including test asphalt quality of constructor company who is responsible for repairing road and construction road of BMA.

2.8 Building Control Division

This division is responsible for control building construction which public request for permission in Bangkok Metropolis area. The objective for construction must be safety including relevant for city plan. Examination construction plan and calculation for safety of building construction by relevant permission plan, if anyone does not proceed as same as the plan, this division has authority to change or order to destroy that building.

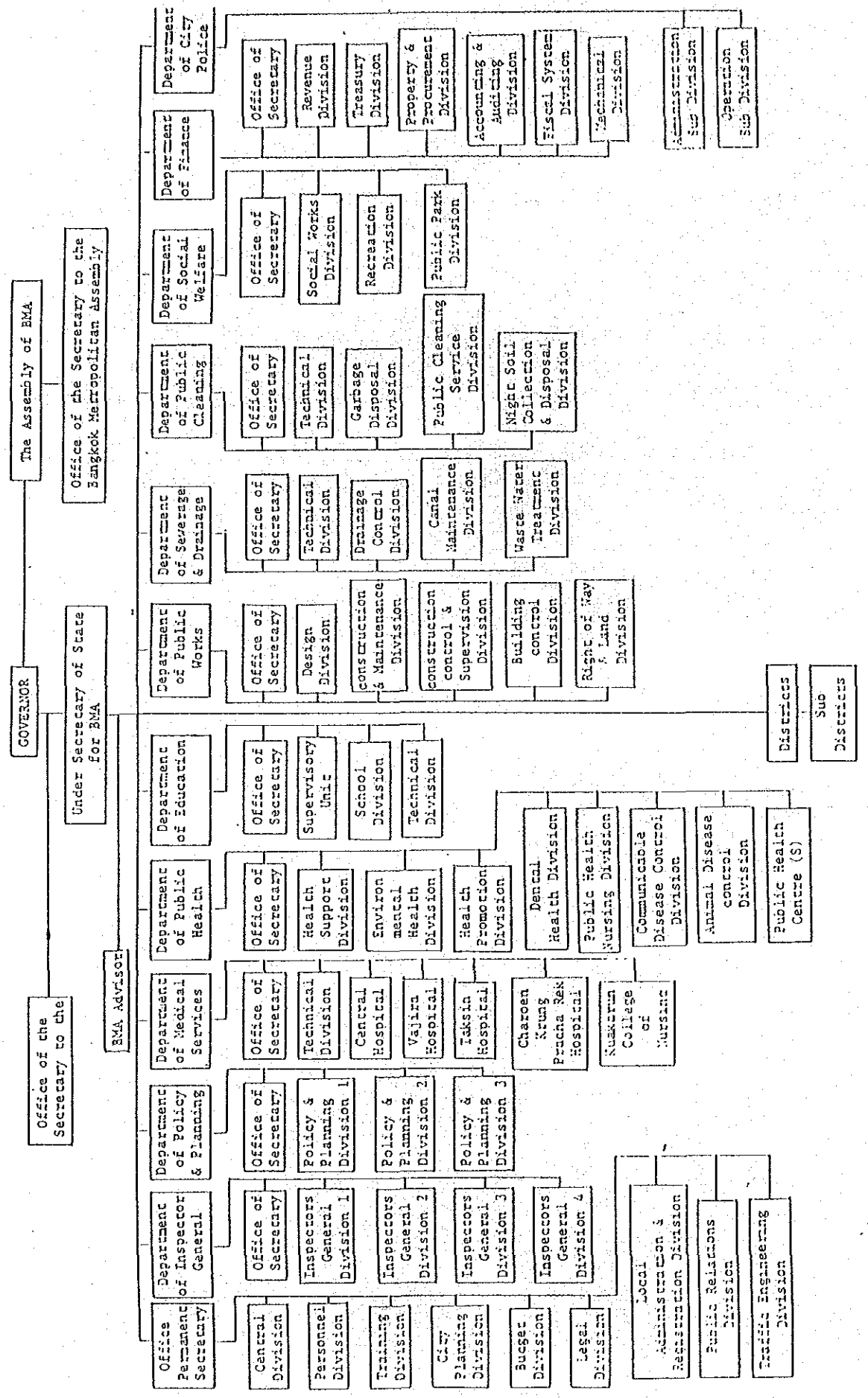
1. Administration Section handle for filing, receiving and delivering document, correspondence, accumulating statistic of property, setting up budget and expenditure.
2. Building Permit Section handle for construction for permission plan, calculation the safety of building which people request for approval, especially the building which is higher than 4 storey.
3. Building Control & Inspection Section handle for consideration the building which is constructed by relevant the permission or not. Proceeding about building which is built as correct as act of registration.
4. Building Mapping Section handle for arrangement building map which is approval for construction. Follow up house registration and set up space area scope for parking by relevant BMA building act.
5. Design Service Section handle for servicing the public about employment of design, drawing within construction cost not over 300,000 Baht which is new building in Bangkok Metropolis and preparing brochure of house model for public.

Section 2

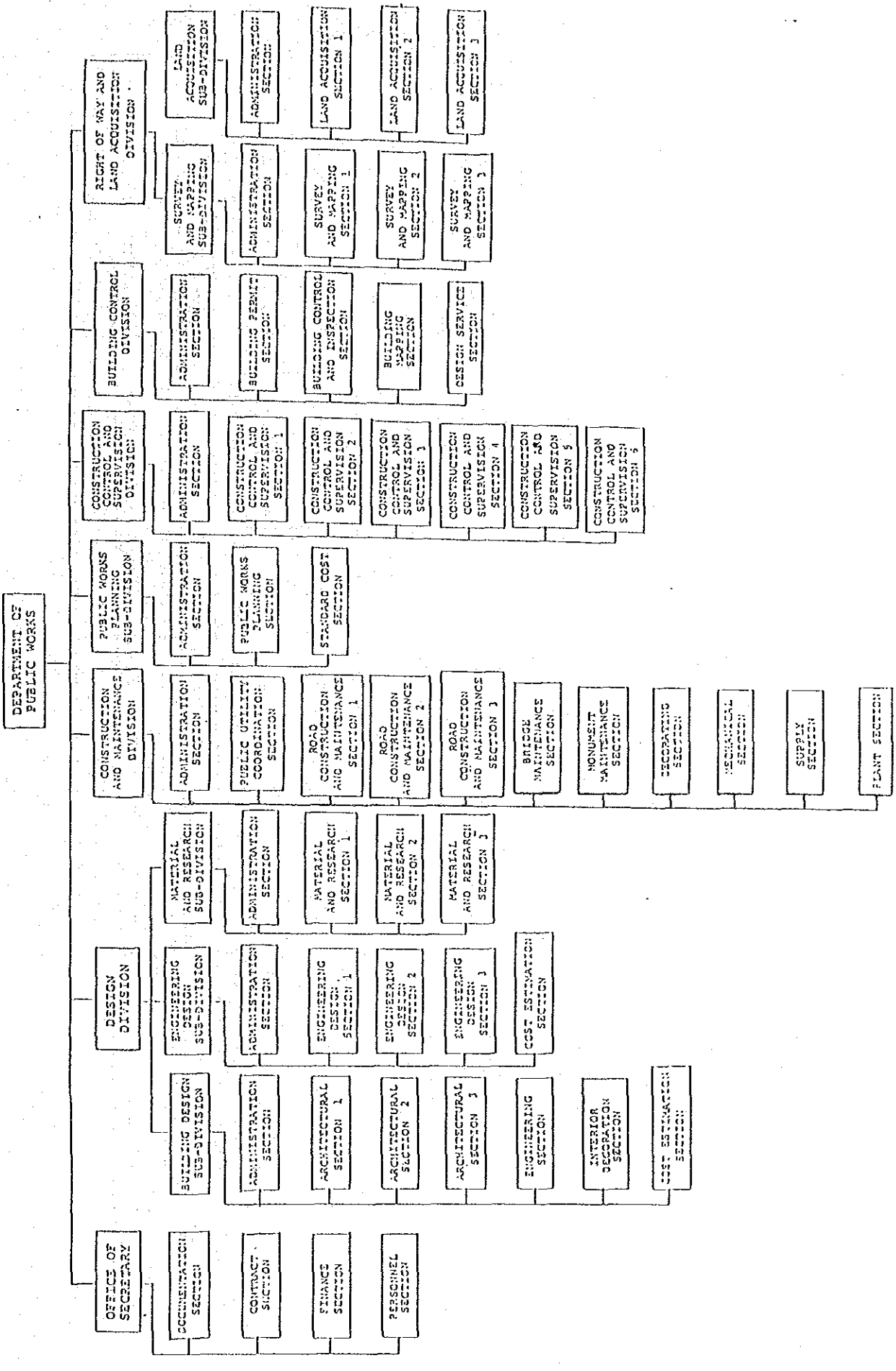
Appendices

Index of Appendices

The Bangkok Metropolitan Administration Organization Chart



Organization Chart of PWD



Organization Chart of Responsibility of High Rank Rerson Incharge of PWD

Table of Manpower of PWD and Dividing by Position Rank

(July 1985)

No.	Offices	Level (Government Officers)											Temporary Employees	Total
		1	2	3	4	5	6	7	8	9	10	11		
PWD	Public Works Department	-	-	-	-	-	2	-	-	2	1	-		5
1.	Office of Secretary	3	7	30	10	7	3	1	-	-	-	-	3	64
2.	Design Division	5	31	42	43	35	12	3	1	-	-	-	1	173
3.	Construction & Maintenance Division	14	24	43	68	9	6	-	1	-	-	-	19	184
4.	Construction Control & Supervision Division	8	13	75	59	5	7	-	1	-	-	-	-	168
5.	Building Control Division	3	2	33	32	23	-	2	1	-	-	-	-	96
6.	Right of Way & Land Acquisition Division	9	34	55	21	11	6	2	1	-	-	-	2	141
7.	Public Works Planning Sub-Division	-	4	13	10	5	1	-	-	-	-	-	-	33
	Waiting for Occupation	-	-	-	-	-	-	-	-	-	-	-	2	2
	Total	42	115	291	243	95	37	8	5	2	1	-	27	866

Sources : Manpower and Organization Analysis Section, Personnel Division, Office of Under Secretary of State for Bangkok Metropolitan Administration (July 1985)

Table of Responsibility about Budget of Expenditure of PWD (1981-1985)

No.	Budget Year Detail of Expenses	1981	1982	1983	1984	1985
1.	Salary	31,238,000	35,091,600	42,457,000	44,034,700	45,394,600
2.	Permanent Wage	27,955,300	29,279,100	36,103,500	37,634,500	39,125,000
3.	Temporary Wage	2,318,500	2,274,100	2,259,900	4,466,200	4,481,300
4.	Compensation	2,550,000	2,590,000	2,417,800	1,644,500	1,930,000
5.	Expenses	14,430,000	15,044,000	14,000,700	22,279,000	21,483,000
6.	Materials	26,520,000	29,909,000	40,091,300	34,224,800	44,242,500
7.	Supplies	1,706,350	2,327,200	19,800,650	3,737,600	628,900
8.	Land & Construction	285,254,734	271,276,500	302,734,900	355,755,094	390,990,570
9.	Other Expenses	67,443,594	59,850,310	23,223,730	120,856,856	45,239,290
10.	Public Welfare	723,200	1,028,800	-	2,280,300	3,022,700
11.	Subsidy	203,677,900	256,384,000	200,000,000	408,752,000	393,569,000
	Total Expenses	663,817,138	705,074,610	683,089,480	1,044,665,550	990,106,860

Sources : Finance Section, Office of Secretary, PWD